REPORT

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Non-Residential Assessments Program Year 2014-2016 Evaluation Report

Submitted to Duke Energy Carolinas in partnership with Tetra Tech

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Principal authors:

Patrick Burns, Senior Vice President

Lynn Roy, Principal

Nathanael Benton, Senior Consultant

Carrie Koenig, Dan Belknap, Tetra Tech

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1 Executive Summary

1.1 Program Summary

The Non-Residential Assessment Program (NR Assessment Program) helps Duke Energy Carolinas (DEC) non-residential customers in North Carolina and South Carolina find energy saving opportunities within their businesses by subsidizing a portion of the cost of an energy assessment. Energy assessments are professional engineering studies that identify energy conservation measures that, when implemented, can assist in lowering customer energy costs.

The scope of the assessments ranges from whole-facility ASHRAE Level II[1] and Level III Energy Audits[2] (with and without calibrated simulation modeling) to studies targeting specific systems such as compressed air or commercial refrigeration systems. The energy assessments are conducted by pre-approved trade allies. Energy savings are credited to the NR Assessments Program by way of paid incentives through the Duke Smart $aver Custom Program for measures recommended in an NR Assessment report. The Program covers up to 50% of the energy assessment cost.

1.2 Evaluation Objectives and High Level Findings

This report presents the results and findings of evaluation activities for the Duke Energy Carolina's Non-Residential Assessments program conducted by the Evaluation Team, collectively Nexant Inc. and our subcontracting partner, Tetra Tech, for the period of January 2014 through December 2016.

1.2.1 Impact Evaluation

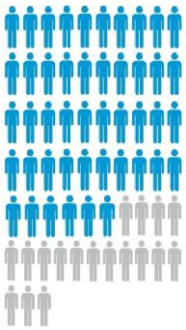
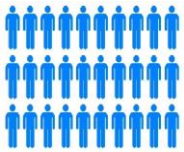
The overarching goals for the NR Assessments impact evaluation were to quantify accurate and supportable energy (kWh) and demand (kW) savings for measures and equipment implemented in customer facilities attributed to the NR Assessments Program. Energy and demand savings estimates were developed for measures implemented with the aid of a financial incentive from the Duke Smart $aver Custom program (herein referred to as "Custom Incentive Participants") and for measures implemented at a customer site without receiving a Duke Custom incentive (herein referred to as "Assessment-Only Participants"). Forward-looking energy and demand savings estimates were also developed for measures reported by participants to be currently in

[1] ASHRAE Level II: Energy Survey and Analysis – This energy audit involves interviews with select facility staff, a review of utility bills or other operating data and a walk through of the facility. Often a Preliminary Energy Use Analysis and Walk-Through Analysis are completed in tandem. The goal is to identify glaring areas of energy waste or inefficiency. The data is compiled and used to complete a preliminary report detailing low-cost/no-cost measures and detailed energy calculations and financial analysis of proposed energy efficiency measures.

2 ASHRAE Level III: This level of engineering analysis involves more detailed field data gathering as well as a more rigorous engineering analysis. It provides detailed project cost and savings calculations with the high level of confidence required for major capital investment decisions. This audit expands on the Level II audit by providing a dynamic model of energy use characteristics of both the existing facility and all energy conservation measures identified. The building model is calibrated using actual utility data to provide a realistic baseline against which to compute operating savings for proposed measures. Existing utility data is supplemented with sub-metering of major energy consuming systems and monitoring of system operating characteristics.

progress or to be implemented by January 1, 2018 (herein referred to as “Pipeline Savings”). Figure 1-1 further defines each participant category referenced within this report and also provides a summary of participation for the evaluation period.

Figure 1-1 NR Assessment Participant Categories and Sample Population Summary

	**"Non-Participants" (gray) -** Customers who showed initial interest in the NR Assessments Program by submitting an assessment application form through the Duke Energy website and may or may not have completed a pre-screening/scoping call with Account Manager, Program Manager, and/or Trade Ally, but ultimately opted out or was determined to be ineligible to participate (**17 Total Non-Participants**). **"Participants" (light blue) -** Customers that opted in and received an energy assessment report through the NR Assessment Program. For the purposes of this report, Participants have been sub-classified based on whether recommended ECMs were implemented and, if so, whether they received an incentive through the Duke Custom Program (**46 Total Participants**).
	**“Assessment-Only Participant w/ No Verified Savings”** - Participant received an energy assessment report through the NR Assessments Program, but did not implement any of the recommended energy conservation measures (ECMs) identified in the energy assessment report (**30 of 46 Participants**.
	**“Assessment-Only Participant w/ Verified Savings (Spillover)”** - Participant received an energy assessment report through the NR Assessments Program and has implemented measures from the assessment report, but did not apply for or receive an incentive through the Duke Custom Program (**9 of 46 Participants**).
	**“Custom Incentive Participant”** – Participant received an energy assessment, implemented energy conservation measures attributed to the NR Assessments Program, and received an incentive through the Duke Custom Program (**7 of 46 Participants**).

Activities included in-depth reviews of all energy assessment reports, on-site verification for a census of Custom Incentive Participant sites as well as some Assessment-Only Participant sites, and in-person or phone interviews with program participants paired with engineering desk analyses to estimate gross savings for all implemented measures attributed to the NR Assessments Program.

1.2.2 Process Evaluation Objectives

The Evaluation Team collected data from a variety of sources to address the researchable questions identified at the beginning of the study. Table 1-1 contains the list of research objectives and the data sources used to investigate each one.

Table 1-1 Process Evaluation Research Objectives and Data Sources

Preliminary Research Questions	Document Review	Interviews with Key Contacts	Participant Survey	Trade Ally Survey
What non-residential segments are served by the program? How do customer characteristics of participants compare to the segments that are targeted for the program? Are there segments that have high potential and should be reached?		✓	✓	✓
How are customers engaged in the Non-Residential Energy Assessment, and what is the most effective marketing source?		✓	✓	✓
How influential is the program in customers' decisions to install the efficient measure? Is the focus of low and no-cost measures allowing participants to consider additional capital intensive projects with greater energy savings?			✓	✓
What barriers exist for customers who show interest but do not move forward with an audit? Why do customers choose not to move forward with projects after receiving an assessment?			✓	
Does the Non-Residential Assessment Program provide sufficient documentation and information for customers? Is the presentation of the information clear and understandable? What other support should the program provide?	✓	✓	✓	✓
What is the persistence of program engagement with participants? Do they follow up with customers to encourage project completion after audit? How effective is that process?		✓	✓	✓
What percentage of customers install efficiency measures, either within or outside Duke programs? How can that "conversion rate" be increased? What are the barriers to customers' adoption? Are customers making behavioral changes as a result of the information provided in the assessment?	✓		✓	✓
How satisfied are customers with the program and its components?			✓	
What program changes may improve program performance and energy efficiency equipment installation rates?	✓		✓	✓

Preliminary Research Questions	Document Review	Interviews with Key Contacts	Participant Survey	Trade Ally Survey
Is sufficient data being captured to effectively verify recommendations and savings? How do program participants move between the Non-Residential Assessment Program and other Duke Energy programs?	✓		✓	✓

1.2.3 High Level Findings

1.2.3.1 Gross Impact Evaluation Key Findings

The gross impact evaluation found that the NR Assessments Program realization rate was 84% for energy (kWh) and 85% and 86% for Summer and Winter demand (kW), respectively. An encouraging parameter is the spillover and pipeline energy savings being generated by the energy assessment reports. The combined total of Custom Incentive Participant, Assessment-Only Participant spillover, and pipeline energy savings are projected to be on the order of 42 million kWh. Summaries of program-level gross impact results for energy (kWh) and demand (kW) are provided in Table 1-2 and Table 1-3. Table 1-4 shows the combined energy and demand savings from Custom Incentive Participant projects, verified Spillover, and Pipeline. The combined savings estimates exclude any considerations for energy or demand savings associated with ECMs implemented through the Duke Smart $aver Prescriptive Program. This is due to the fact that these savings are already claimed by the Prescriptive Program.

Table 1-2 Program Reported and Verified Gross Energy and Demand Impacts from Measures Implemented with Aid of Duke Custom Incentive

Measurement	Gross Reported (MWh)	Gross Verified (MWh)	Realization Rate
Energy (MWh)	21,843	18,408	84%
Summer Demand (kW)	2,142	1,833	86%
Winter Demand (kW)	2,132	1,811	85%

Table 1-3 Program Evaluated Spillover and Pipeline Energy and Demand Impacts

Measurement	Gross Energy MWh	Gross Demand kW
Spillover (Assessment-Only Participants)	2,421	301
Pipeline Savings	21,080	1,980

Table 1-4 Combined Energy and Demand Impacts (Custom Incentive Participants, Spillover, and Pipeline)

Measure Category	Energy Savings (kWh)	Demand Savings (kW)
Custom Participants	18,408,296	1,845
Assessment-Only Participants	2,420,541	300
Pipeline Projects	21,080,199[3]	1,980
Total Savings	**41,909,036**	**4,125**

Some additional high level findings from the impact evaluation are summarized below.

- The average duration of time between the date an energy assessment report is issued and the date a measure is eventually implemented ranges from 6 months to 3 years. The average duration is approximately 2 years (e.g., the majority of the evaluated pipeline energy savings were identified in energy assessment reports finalized in January and May of 2015). This is partially explained by the capital-intensive nature of many of the energy conservation measures being recommended in the energy assessment reports. The NR Assessments Program focuses on identifying high impact measures that result in significant energy and financial savings. Implementation of the recommended energy conservation measures (ECMs) also often requires the involvement of third-party engineers and/or designers and approval from the highest management levels of an organization, which contributes to delayed implementation.
- The Evaluation Team found the energy assessment reports to be very in-depth and often identified energy conservation opportunities that the customer may not have been considering or been made aware of without the program.
- The level of transparency could be improved with regard to energy savings estimates in cases where simple engineering models were used. Sufficient detail is typically provided for projects involving a Duke Smart $aver Custom incentive, but key assumptions from measures not involving an incentive were much less transparent.

Net Impact Evaluation Key Findings

The net-to-gross evaluation found that the program is extremely effective at producing energy savings, resulting in a net-to-gross ratio of 1.06. Customers largely were not planning to complete the energy-efficiency measures prior to interacting with the program, and credited the program with influencing their decisions to complete the projects. In addition, customers completed additional projects without receiving an incentive from Duke Energy, but attributed influence to the program, resulting in spillover savings that outweighed the small amount of freeridership (FR). Table 1-5 presents the evaluated net verified savings and associated net-to-gross ratio for the program.

[3] Pipeline energy savings will occur outside of the evaluation period (2014-2016) The Evaluation Team felt it was beneficial to show Pipeline energy savings because the energy assessment reports were completed during this timeframe.

Table 1-5 Net-to-Gross Evaluation Results

Measurement	Gross Verified Energy Savings (kWh)	Net Verified Energy Savings (kWh)	Ratio
Net of Freeridership	15,255,745[4]	14,798,073	0.97
Program-influenced Spillover	18,408,296	1,656,746	0.09
Net-to-Gross	**18,408,296**	**19,512,794**	**1.06**

** Net of Freeridership = (1 – 0.03 FR) = 0.97*

Process Evaluation Key Findings

Overall the program is operating as intended and customers are satisfied with their experiences with the program as well as Duke Energy. Both participant and non-participant respondents appreciate Duke Energy's effort in helping customers identify areas for improvements and saving money. Given cost is a major barrier to making improvements, respondents appreciate the rebates and incentives available and the support vendors provide in helping to navigate the rebate and incentive processes. Additional high-level findings include the following:

- The primary source of program awareness is from Duke Energy, specifically the account managers
- Satisfaction with the program overall and its components is high among Participants and Non-Participants
- The need to upgrade equipment and the need to reduce energy costs were the main reasons for participant respondents wanting an assessment as well as the reason non-participant respondents were considering an assessment
- The cost of the assessment was the main reason why non-participant respondents cited for not moving forward with an assessment
- Three-fourths of participant respondents installed equipment based on recommendations
- The tracking database lacked key information for evaluation activities and program/project tracking

[4] This reflects only the energy savings of customers who responded to the net-to-gross survey.

1.3 Evaluation Conclusions and Recommendations

Based on evaluation findings, the Evaluation Team concluded the following and provides several recommendations for program improvement.

1.3.1 Impact

Conclusion 1: It would be advantageous for the NR Assessments Program to maintain final versions of all ex ante[5] building energy simulation files used by trade allies to develop energy savings estimates.

- **Recommendation 1:** We recommend that trade allies submit final versions of all ex ante energy simulation modeling files whenever a whole building energy simulation approach is used as the primary source for generating project-level energy and demand savings estimates.

- **Recommendation 2:** We recommend that trade allies provide key inputs and assumptions used in engineered savings estimates in order to provide better transparency with regard to key assumptions and improve evaluation effort of the program. .

Conclusion 2: There are several opportunities for improvement for tracking NR Assessment Projects.

- **Recommendation 3:** The Evaluation Team has several recommendations for how to improve assessment project tracking processes.

    - We recommend that the program develop a means for linking NR Assessment projects with subsequent Custom or Prescriptive Smart $aver incentive applications and payments.

    - We recommend updating the project status (incentive offered, incentive paid, report complete, etc.) in the master tracking system on a monthly basis.

    - We recommend that the program track additional project details including the ECMs identified in each assessment report, estimated measure-level energy and demand savings impacts, and incentives paid to the Customer through the Duke Custom or Prescriptive Programs following an assessment.

1.3.2 Process

Conclusion 1: One of the main reasons customers did not follow-through after expressing interest was because of the cost associated with the assessment. Customers are not necessarily aware of the different levels of assessments or the fees associated with them.

[5] The term “ex ante” represents the forecasted energy and demand savings rather than the actual results.

Making customers aware of the services Duke Energy provides, both for assessments and rebates, may encourage use of Duke Energy program offerings.

- **Recommendation 1:** Increase program marketing so customers are aware of the different levels of assessments and are aware of the rebate and incentive programs.

Conclusion 2: It is important to continually follow-up with customers who received an assessment to make sure they are aware of the rebates available at the time they decide to move forward with their project. The process for this follow-up needs to be clear and all parties involved, including account managers, should remain updated. Account managers could follow-up with customers who received an assessment to encourage rebate program use.

- **Recommendation 2:** Ensure processes are in place for follow-up once an assessment is complete.

- **Recommendation 3:** Continue to keep Account Managers informed and involved in the assessment process and project status.

Conclusion 3: The program currently tracks savings based on customers who received an assessment and received a rebate through the Smart $aver Custom program. If a customer who received an assessment made an improvement but went through the prescriptive program, the participation is tracked through the prescriptive program. Tracking customers who received prescriptive rebates within the Custom program would allow account managers and others to focus follow-up efforts on customers who have not followed through with any recommendations.

- **Recommendation 4:** Within the Custom program, track customers who receive prescriptive rebates and custom rebates.

- **Recommendation 5:** Assessment report formats varied from trade ally to trade ally. This is to be expected in instances where a study only focuses on a specific building system, but it is recommended that benchmarks be established to ensure that all critical information is included in every report. As an example, all reports should provide savings estimates in units of energy (kWh), demand (kW), and dollars. There were several reports included in the evaluation that only provided financial savings estimates ($).

2 Introduction and Program Description

2.1 Program Description

The Non-Residential Assessment Program (herein NR Assessments Program) helps Duke Energy business customers in North Carolina and South Carolina find energy saving opportunities within their organizations by subsidizing a portion of the cost of an energy assessment. Energy assessments are professional engineering studies that identify energy conservation opportunities that, when implemented, will assist in lowering energy costs. The program follows a specific methodology and organizations approved for participation receive the following:

- No charge pre-assessment energy scoping to identify high-level energy savings and areas of opportunity
- An on-site energy assessment performed by an experienced and professional engineering firm
- Up to 50 percent subsidy of assessment costs
- A comprehensive Energy Report with a detailed analysis of utility bills, energy consumption by system type, potential energy conservation measures with savings projections, full financial analysis and estimated utility incentives
- Engineering and application support for Duke Energy's Smart $aver® Incentive Program, that can be utilized to help fund projects
- Assistance with post implementation project verification as needed for the Smart $aver program

Various types of assessments are available that cover most building types as well as specific electrical infrastructure and systems. Specifically, energy assessments are available to the following building types:

- Commercial offices
- Industrial
- Hospitals and health care facilities
- Colleges and universities
- K-12
- Public/government
- Data centers
- Hospitality
- Churches/places of worship

- Arenas/sports complexes

And the assessments explore energy savings for the following key technologies:

- Lighting and lighting controls
- HVAC equipment and controls
- Building envelope
- Motors
- Compressed air
- Commercial refrigeration
- Load shifting
- Electric hot water fixtures
- Kitchen equipment
- Transformers

2.2 Program Implementation

The NR Assessments Program is implemented by a team of preferred and pre-approved trade allies. There are currently three trade allies serving the program: Chicago Bridge & Iron, CLEAResult, and ThermalTech Engineering. Energy assessment reports developed by former trade allies including the Building Intelligence Group and I&M Industrials were also reviewed as part of the NR Assessments impact evaluation. The Building Intelligence Group's involvement with the program stopped in early 2016. Reports written by I&M Industrials were mostly from Program year 2014.

Customers who are interested in participating must first make a formal request through the Duke Energy website and meet program eligibility requirements. Once eligibility has been confirmed and a customer is pre-approved to participate, the process begins with a no charge pre-assessment energy scoping meeting between the customer, assessment program manager, and a preferred trade ally. Following this initial call, for those who express interest in moving forward with an assessment, the customer then receives a proposal from the trade ally outlining the scope of services and a lump sum cost to complete. A portion of the assessment cost (up to 50%) is covered by the NR Assessments Program.

2.2.1 Participation Summary

For reporting purposes, Non-Participants are customers who engage the program by submitting an assessment request, go through the no charge pre-assessment energy scoping meeting, and/or receive a proposal for an assessment from a trade ally, but opt to not go through with the assessment. All customers who elect to move forward with an energy assessment are identified as participants.

"Assessment-Only Participants" are those who receive an energy assessment report and either choose not to implement any of the recommended ECMs or implement all or a portion of the

tem without receiving a Duke Custom incentive. Savings attributed to Assessment-Only projects were treated as spillover in the evaluation.

Participants who implement all or a portion of the recommended energy conservation measures and receive a financial incentive from the Duke Custom Smart $aver Program are classified as "Custom Incentive Participants." A summary of program participation from 2014 through 2016 is provided in Table 2-1.

Table 2-1 DEC NR Assessments Program Participation Summary 2014-2016

NR Assessments Population Summary	Participants/Non-Participants	Unique Premises
Non-Participant (Opted Out / No Report)	17	17
Assessment-Only Participant / No Verified Savings	28	30
Assessment-Only Participant w/ Verified Savings (Spillover)	4	9
Custom Incentive Participant	4	7
Total	**53**	**63**

The Evaluation Team conducted on-site inspections at all seven of the Custom Incentive Participant sites. On-sites were also conducted at six of the Assessment-Only Sites with verified savings. Primary data collection activities for the remaining Assessment-Only sites were accomplished through phone interviews and desk reviews.

Figure 2-1 and Figure 2-2 summarize the distribution of reported energy (kWh) and demand (kW) savings for Custom Incentive Participant projects by measure category.

Figure 2-1 Distribution of Reported Energy Savings from Custom Incentive Participants

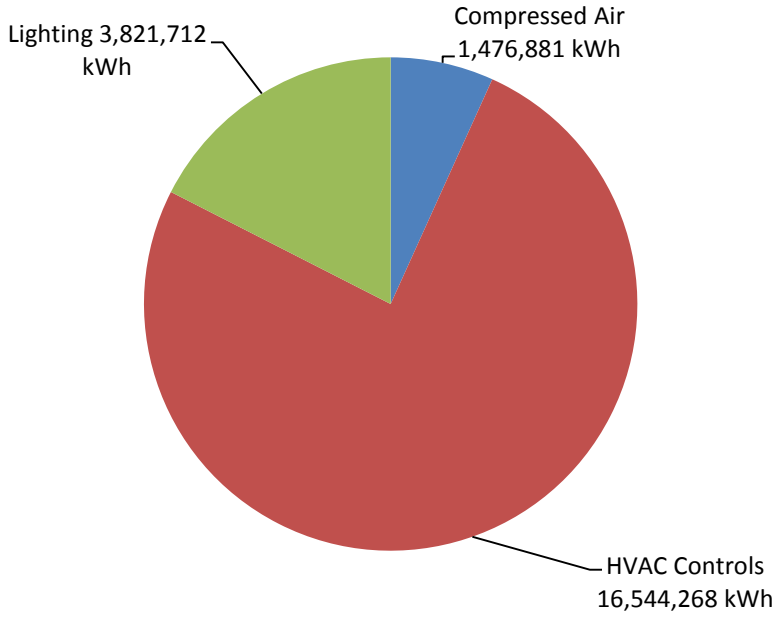


Figure 2-2 Distribution of Reported Demand Savings from Custom Incentive Participants

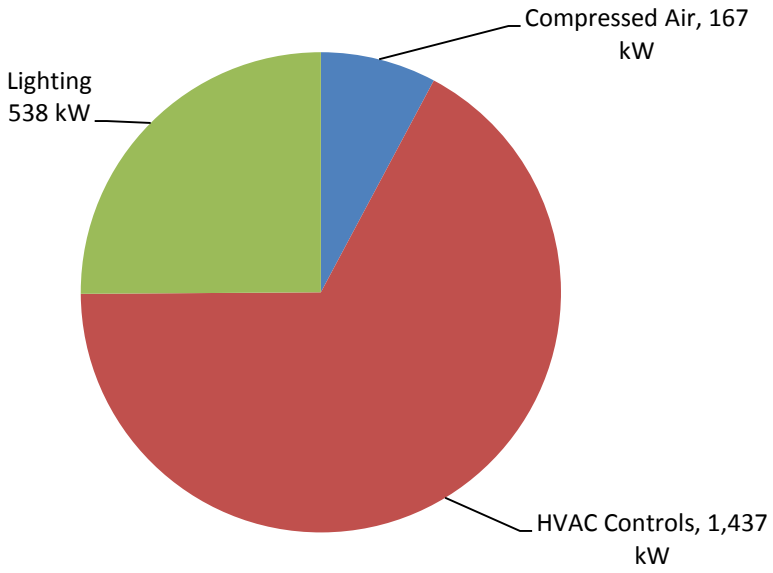


Table 2-2 provides a breakdown of reported energy and demand savings by Program year. It should be noted that the distribution of savings by year are approximations based on a variety of sources including the reported timeframe of measure implementation provided during participant interviews, Smart $aver application dates, and/or the date on which an energy assessment report was issued. Energy savings in 2015 were substantially higher based on major HVAC Control System upgrade projects at four large hospitals that were completed.

Table 2-2 Reported Energy and Demand Savings by Program Year

Program Year	Reported Energy Savings (kWh)	Reported Summer Demand (kW)	Reported Winter Demand (kW)
2014	1,476,881	167	167
2015	16,743,918	1,528	1,518
2016	3,622,062	447	447

3 Key Research Objectives

3.1 Gross Impact

The impact evaluation processes followed standard industry protocols and definitions, where applicable, and include the Department of Energy Uniform Methods Protocol[6], as an example. As part of evaluation planning, the Evaluation Team outlined the following activities for this program evaluation:

- Quantify accurate and supportable energy (kWh) and demand (kW) savings for measures and equipment being implemented in customer facilities attributed to the NR Assessments Program;
- Quantify energy (kWh) and demand (kW) savings for measures and equipment being implemented in customer facilities, but for which the customer did not receive a Duke Energy incentive (spillover savings);
- Determine whether deeper savings can be achieved by assessing the depth and veracity of the energy efficiency opportunities identified by the assessment;
- Assess the program market effects and rate of free riders and spillover effects;
- Monitor enrollment process to determine effectiveness (enrollment script, enrollment specialist phone etiquette, etc.);
- Review Non-Residential Rebates and Custom Program applications that identify participants originally brought into the program through energy assessments; and
- Measure and document the level of customer satisfaction with the programs and its processes.

3.2 Net Impact

The goal of net impact evaluation was to estimate the overall energy impact that is attributable to the program. This estimate comprises two components: free-ridership and spillover.

Freeridership is the estimate of what proportion of the program's savings would have happened in the absence of the program. Free ridership takes into account the customers' plans prior to engaging the program and the various influences the program can have on the customer such as the assessment report, incentives, and other interaction with the program.

Spillover estimates additional energy savings for efficiency projects that were completed without receiving a program incentive, but were influenced by the program in some other way.

[6] The DOE's Uniform Methods Project for Determining Energy Efficiency Program Savings can be found at http://www1.eere.energy.gov/office_eere/de_ump.html.

Net program results expressed through a net-to-gross ratio, which is calculated as follows:

$$\text{Net-to-gross} = (1 - \text{Freeridership \%}) + \text{Spillover \%}$$

3.3 Process

Process evaluations are designed to support continuous program improvement by identifying successful program elements that can be expanded upon as well as underperforming/inefficient processes that could be holding back program performance. The process evaluation for the NR Assessments Program sought to:

- Assess how participant characteristics compare to segments targeted for the program
- Assess the sources of customer engagement and most effective marketing source
- Assess influence the program has on customers' decisions to install EE measures
- Assess barriers for customers who show interest but do not move forward with an audit
- Understand reasons customers choose not to move forward with projects after receiving an assessment
- Assess whether sufficient documentation and information are provided to customers
- Assess persistence of program engagement with participants
- Assess satisfaction with the program and its components including suggestions for program changes
- Understand participant movement between the Assessment program and other Duke programs.

4 Impact Evaluation

4.1 Approach

The evaluation team's impact analysis focused on the energy and demand savings attributable to the NR Assessments Program for the period of January 2014 through December 2016. The evaluation was divided into two research areas to determine gross and net savings (or impacts). Gross impacts are energy and demand savings estimated at a participant's site that are the direct result of implementing measures identified in an energy assessment report. Net impacts are a reflection of the degree to which the gross savings are a result of the program efforts and funds. The Evaluation Team verified energy and demand savings attributable to the program by conducting the following impact evaluation activities:

- Review of NR Assessments and Custom Program participant databases
- Completion of on-site verification at all Custom Incentive Participant sites and select Assessment-Only Participant sites
- Telephone and in-person interviews to verify key inputs into savings calculations
- Estimation of gross verified savings using primary data collected
- Comparison of the gross-verified savings to program-evaluated results to determine realization rates
- Application of attribution survey data to estimate net-to-gross ratios and net-verified savings at the program level

4.2 Database Review

Review of the program database and program participation records provided details that informed all evaluation activities. The database review process required multiple rounds of data requests before the Evaluation Team was able to develop a full understanding of program participation. This is due to the fact that not all information was being tracked in a single database for the NR Assessments Program. Many of the details necessary to evaluate gross savings had to come from the Duke Smart $aver Custom Program tracking database in instances where the participant implemented measures with the aid of an incentive from the Duke Custom Program.

The database review began with a preliminary data request for an extract for the NR Assessments Program for program years 2014 through 2016. The first priority of this review was to identify the status of each participant included in the initial extract. There were a total of 63 unique premises identified in the initial extract. Through the review process and based on supplemental feedback from the program manager it was determined that there were a total of 46 program participants for Program Years 2014 through 2016. The Evaluation Team was informed by the program manager that 17 of the customers opted out and did not receive a

report. Once the participation status of each project was determined, the Evaluation Team requested copies of all energy assessment reports.

All energy assessment reports were then reviewed in detail by the Evaluation Team. Standardized processes for conducting these reviews were established and the Evaluation Team developed a MS Excel-based database for tracking key details from each report including measure category and a brief description of each recommended ECM identified in the report. The aggregated results were then shared with the process team for reference during participant process surveys which also functioned as a means for pre-screening participants for inclusion in the impact evaluation. During each participant interview the process team would inquire as to whether any of the recommended ECMs had been implemented at a customer site. Those who affirmed having implemented measures were then followed up with the Evaluation Team to gather information necessary to calculate savings.

4.3 Targeted and Achieved Sampling

Original sample targets from the Evaluation Plan were based on a first estimate on the level of NR Assessments Program participation, which ended up being too high. The sample targets were adjusted downward once true participation levels were determined. This issue was brought to the attention of Duke Energy early on in the evaluation process.

There were a total of 46 energy assessments conducted between January 2014 and December 2016. Actual achieved sampling for the impact evaluation is shown in Table 4-1.

Table 4-1 Achieved Sampling for NR Assessment Program Impact Evaluation

Jurisdiction	Category	Desk Reviews	On-Site M&V
Duke Energy Carolinas	Projects w/ Program-Tracked Savings	0	7
	Projects w/ Identified Spillover Savings	3	6
	Recent Energy Assessment Projects	2	0
	Total	**2**	**13**

A census of Custom Incentive Participant projects were evaluated; therefore, uncertainty and error bounds for savings estimates provided in this report are not applicable.

4.4 Impact Evaluation Methodology

The gross program energy impacts were evaluated using the data collection and analysis approaches described below. This section of the report also outlines the procedures and equations used to estimate energy and demand savings.

4.4.1 Data Collection

As outlined in prior sections, the gross impact evaluation process began with a thorough review of each energy assessment report where the evaluation team extracted key details and data and recorded them in a central master tracking database. This information was referenced while conducting phone surveys in order to determine whether any ECMs were implemented as part of pre-screening process. Data collection activities conducted for the impact evaluation were dependent upon a few influencing parameters determined during the data review process:

- Participation Classification: Is the participant a Custom Incentive Participant (Projects w/ Program-Tracked Savings) or Assessment-Only Participant (Projects w/ Identified Spillover Savings):
  - Custom Participant Sites: on-site verification was conducted at 100% of sites
  - Assessment-Only Participant Sites: on-site verification was conducted at 6 of 9 (67%) of the sites
    - Assessment-Only Participant Sites were also assessed based on level of project complexity and savings:
    - Projects with low measure complexity and low reported energy savings were analyzed using information found in the project documentation and through the telephone survey.
    - Projects with high measure complexity and high reported energy savings were identified as on-site verification candidates.

4.4.1.1 On-site Verification Activities

Before any on-site activities could take place, the Evaluation Team developed a site-specific measurement & verification plan (SSMVP) for each unique premise and completed measure. These were developed in order to create a standardized, rigorous process for the verification of project claims while on-site. Each SSMVP was specifically tailored to verify the equipment that was installed and measures were appropriately implemented as proposed in the energy assessment report. The SSMVP also identified baseline assumptions for verification with on-site personnel in order to validate ex ante, forecasted, savings estimates.

Each SSMVP also identified the specific parameters to be gathered in the field for each measure included in the energy assessment report. The plans also identify a preferred and one or two alternate analysis approaches along with the critical data to be gathered for each. Regardless of the method ultimately selected for the savings analysis, field engineers were instructed to gather the data necessary for all methods identified in the SSMVP. Table 4-2 provides a few examples of the data points typically gathered for several of the more commonly-encountered measures.

During on-site verification, field engineers also requested copies of equipment specifications and sequences of operation. Any available historic trend data (when available) was also obtained from existing HVAC control and central plant sequencing control systems. This

information was particularly useful when developing baseline consumption profiles.

Table 4-2 Key Data Points Gathered for Commonly Encountered ECMs

Measure Name	Baseline or Retrofit
HVAC Controls: Time-of-Day Scheduling	Determine baseline setpoints and schedules through customer interviews Determine post-retrofit setpoints and schedules through central BAS and interviews with customer including the following parameters • Supply air temperature reset strategy and setpoints • Static pressure reset strategy and setpoints • Implemented temperature setbacks Verify economizers have been optimized via customer interview and review of BAS Gather nameplate information from primary heating and cooling systems
HVAC Controls: Operating Room Air Changes & Controls	Determine baseline setpoints and schedules through customer interviews Determine post-retrofit setpoints and schedules through central BAS Verify occupancy schedule of hospital departments Determine baseline terminal unit flow conditions through customer interviews Determine post-retrofit terminal flow conditions through central BAS Determine baseline ACHs from customer interview Determine post- retrofit ACHs through BAS Gather nameplate information from primary heating and cooling systems
HVAC Controls: Chilled Water Plant Upgrades	Determine whether pump head has been reduced through customer interview and any available trend data from BAS Verify system delta T has been increased to 12°F from 8°F through customer interview and BAS Determine whether condenser water reset strategy has been implemented through BAS and verify baseline operations through customer interview
Interior Lighting Upgrades	Quantity of existing fixtures Fixture type of existing fixtures Quantity of retrofit fixtures Fixture type of retrofit fixtures Existing fixture controls, if any New fixture controls, if any Typical schedule and hours of operation Space temperature Type of heating and cooling equipment/specifications

4.4.2 Peak Period Definition

Demand savings were evaluated based on the definition of the peak period provided by Duke Energy, as summarized in Table 4-3.

Table 4-3 Definition of Peak Demand Periods

	Summer	Winter
Month	July	January
Hour	4pm – 5pm	7am – 8am

4.5 Level of Rigor

A variety of analysis approaches were utilized for the impact evaluation. The approach applied was decided based upon the methods used by the trade ally in generating the ex ante[7] savings estimates, the availability of information, and the extent of interactive effects. An overview of each analysis approach applied is provided in Sections 4.5.1 through 4.5.3.

4.5.1 Enhanced Rigor: Whole Building Simulation with On-Site Verification Only

Consistent with IPMVP Option D[8] (Calibrated Simulation), this analysis approach was only used on projects where the ex ante savings estimates were developed from calibrated energy simulation modeling (typically eQuest) and when the Evaluation Team was able to obtain a final copy of the model used to develop the ex ante savings estimates. This information had to come from the trade ally directly. The Evaluation Team was able to obtain final ex ante models from one of the two trade allies (*CB&I*) that used an Option D approach in an energy assessment report. The Evaluation Team was able to connect with the other trade ally, Building Intelligence Group, but they are no longer in business and could only provide MS Excel-based output files from the ex ante *eQuest* simulation models.

Once the models were obtained from the trade ally the evaluation process began by calibrating the ex ante models to verified post-installation conditions and actual historical weather data coincident with post-retrofit utility bills. Historical weather data was obtained from the National Oceanic and Atmospheric Administration (NOAA). The implemented energy conservation measures (ECMs) were then modified to be consistent with baseline operations and the model was then re-run to determine baseline consumption. The difference between the ex ante and ex post simulated models resulted in the estimated first-year savings. The Evaluation Team leveraged any and all available trend data from on-site Energy Management Systems and/or HVAC control systems in order to better inform and assist in calibrating the ex post models. All simulation modeling adhered to the guidelines set forth in the Department of Energy (DOE)

[7] The term “ex ante” represents the forecasted energy and demand savings rather than the actual results.

[8] The International Performance Measurement and Verification Protocol (IPMVP) is published by the Efficiency Valuation Organization (EV0) and can be found at: http://evo-world.org/en/

Uniform Methods Project (UMP)[9] HVAC Controls (DDC/EMS/BAS) Evaluation Protocol and was completed using *eQuest*.

4.5.2 Enhanced Rigor: Billing Analysis with On-Site Verification Only

Consistent with IPMVP Option C (Whole Building), this approach was used for projects involving multiple HVAC control measures with interactive effects and when final ex ante building simulation models could not be obtained from the Trade Ally. This approach entailed a pre- and post-retrofit comparison of weather-normalized whole facility energy consumption. This approach adhered to guidelines set forth in the Department of Energy Uniform Methods Project Protocols for HVAC Controls (Chapter 19) and Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol (Chapter 8).

Our general approach consisted of the following:

1. Fit a premise-level degree-day regression model separately for the pre- and post-periods.
2. For each period (pre- and post-) use the coefficients of the fitted model with normal year degree days to calculate weather-normalized annual consumption (NAC) for that period.
3. Calculate the difference between the pre- and post-period NAC for the site.

This approach was used for four of the Custom Incentive Participant projects. Outlined below is the step-by-step process for this analysis:

Step 1. Fit the Regression Model: The degree-day regression for the site and year (pre or post) are modeled as:

Equation 1: Average Consumption per Day

$$E_m = \mu + \beta_H H_m + \beta_C C_m + \varepsilon_m$$

Where:

E_m = *Average consumption per day during interval m*

H_m = *Specifically, $H_m(T_H)$, average daily heating degree days at the base temperature (T_H) during meter read interval m, based on daily average temperatures on those dates*

C_m = *Specifically, $C_m(T_C)$, average daily cooling degree days at the base temperature (T_C) during meter read interval m, based on daily average temperatures on those dates*

μ = *Average daily baseload consumption estimated by the regression*

[9] The DOE's Uniform Methods Project for Determining Energy Efficiency Program Savings can be found at http://www1.eere.energy.gov/office_eere/de_ump.html.

β_H, β_C = *Heating and cooling coefficients estimated by the regression*

ε_m = *Regression residual*

Step 2. Applying the Model: To calculate NAC for the pre- and post-installation periods for the given site and timeframe, combine the estimated coefficients μ, β_H, and β_C with the annual normal-year or typical meteorological year (TMY) degree days H_0 and C_0 calculated at the site-specific degree-day base, T_H and T_C. The example shown below puts all premises and periods on an annual and normalized basis.

Equation 2: Weather-Normalized Annual Consumption

$$NAC = \mu * 365.25 + \beta_H H_0 + \beta_C C_0$$

Step 3. Calculate the Change in NAC: The difference between pre- and post-program NAC values (ΔNAC) represents the change in consumption under normal weather conditions.

4.5.3 Basic Rigor: Simple Engineer Model (SEM) with On-Site Measurement

Consistent with IPMVP Option A (Partially Measured Retrofit Isolation), this approach was used for all lighting and compressed air measures. An overview of the key inputs and algorithms used to develop energy and demand savings estimates for each of these two measure categories is provided in Sections 4.5.3.1 and 4.5.3.2.

4.5.3.1 Lighting Measures

Equations 1 and 2 were used to calculate energy and demand savings for all lighting retrofit measures.

Equation 3: Lighting Demand Savings

$$\Delta kW = (Qty_{BASE} \times Watts_{BASE} - Qty_{EE} \times Watts_{EE}) / 1000 \times WHF_d$$

Equation 4: Lighting Annual Energy Savings

$$\Delta kWh/yr = (Qty_{BASE} \times Watts_{BASE} - Qty_{EE} \times Watts_{EE}) / 1000 \times HoursWk \times Weeks \times WHF_e$$

Where:

Qty_{BASE} = *Quantity of baseline fixtures*

$Watts_{BASE}$ = *Watts of baseline fixture (based on the specified existing fixture type) (Watts)*

Qty_{EE} = *Quantity of energy efficient fixtures*

$Watts_{EE}$ = *Watts of energy efficient fixture (based on the specified installed fixture type) (Watts)*

HoursWk = Weekly hours of equipment operation (hrs/week)

Weeks = Weeks per year of equipment operation (weeks/year)

*WHF_d = Waste heat factor for demand to account for cooling savings from efficient lighting**

*WHF_e = Waste heat factor for energy to account for cooling savings from efficient lighting**

1000 = Conversion: 1000 Watts per kW

Fixture Wattages

The pre-existing fixture wattages were quoted from industry standards and commercial literature for the applicable type of fixtures.

The installed light fixture wattages were taken from the manufacturer's cut sheets.

Hours of Use

Nexant verified hours of use assumptions by deploying lighting loggers. The lighting operating hours may exceed the facility's posted hours of business.

4.5.3.2 Compressed Air Measures

Energy use reduction for all compressor projects can be calculated by the difference between the energy consumed in the baseline operation minus the energy consumed in the post-retrofit operation. Generally, information is required for compressor capacity in both the baseline and post-retrofit scenarios. Appropriate adjustments are made to ensure the flow profile is equivalent between pre- and post-retrofit conditions unless demand improvements have been made that result in a change in the flow profile. Compressor power at full load can be calculated using Equations 5 and 6.

Equation 5: Compressor Power at Full Load (No VSD)

$$\text{Full Load } kW_{rated} = \frac{(\text{Compressor hp}) \times LF_{rated} \times (0.746\ kW/hp)}{(\eta_{motor})}$$

Equation 6: Compressor Power at Full Load (w/ VSD)

$$\text{Full Load } kW_{rated} = \frac{(\text{Compressor hp}) \times LF_{rated} \times (0.746\ kW/hp)}{(\eta_{motor}) \times (\eta_{VSD})}$$

Where:

Compressor hp = compressor horsepower, nominal rating of the prime mover (motor)

0.746 = horsepower to kW conversion factor

η_{moto} = *motor efficiency (%)*

η_{VSD} = *variable-speed drive efficiency (%)*

LF_{rated} = *load factor of compressor at full load (typically 1.0 to 1.2)*

The above methods for determining the instantaneous demand of an air compressor at a given load is then repeated for many bins of hour-CFM operation. This is commonly referred to as a CFM demand profile. A demand profile is developed to provide accurate estimates of annual energy consumption. A demand profile typically consists of a CFM-bin hour table summarizing hours of usage under all common loading conditions throughout a given year.

The annual CFM profile is used to determine base case and proposed case energy use. For both, compressor electricity demand for each CFM-bin is determined from actual metering data, spot power measurements, historical trend data or CFM-to-kW lookup tables.

The difference in energy consumption between an air compressor operating in idling mode and being physically shut down can be significant depending on the base case and post-retrofit case methods of system control. For example, a rotary screw compressor with inlet valve modulation (w/blowdown) controls will draw 26% of full-load power (kW) when operating in idling mode; whereas a VSD-controlled system (w/stopping) has zero load for the same bin-hours. Table 4-4 shows the average percent power versus percent capacity for rotary screw compressors with various control methods.[10]

Table 4-4 Average Percent Power Versus Percent Capacity for Rotary Screw Compressors With Various Control Methods

	% Power							
% Capacity	On/Off Control	Load/Unload (1 gal/CFM)	Load/Unload (10 gal/CFM)	Inlet Valve Modulation (w/o Blowdown)	Inlet Valve Modulation (w/Blowdown)	Variable Displacement	VSD w/Unloading	VSD w/Stopping
0%	0%	27%	27%	71%	26%	25%	12%	0%
10%	10%	32%	35%	74%	40%	34%	20%	12%
20%	20%	63%	42%	76%	54%	44%	28%	24%
30%	30%	74%	52%	79%	62%	52%	36%	33%
40%	40%	81%	60%	82%	82%	61%	45%	41%
50%	50%	87%	68%	86%	86%	63%	53%	53%
60%	60%	92%	76%	88%	88%	69%	60%	60%

[10] Source: Department of Energy Uniform Methods Project: Chapter 22: Compressed Air Evaluation Protocol

% Power								
% Capacity	On/Off Control	Load/Unload (1 gal/CFM)	Load/Unload (10 gal/CFM)	Inlet Valve Modulation (w/o Blowdown)	Inlet Valve Modulation (w/Blowdown)	Variable Displacement	VSD w/Unloading	VSD w/Stopping
70%	70%	95%	83%	92%	92%	77%	71%	71%
80%	80%	98%	89%	94%	94%	85%	80%	80%
90%	90%	100%	96%	97%	97%	91%	89%	89%
100%	100%	100%	100%	100%	100%	100%	100%	100%

The energy consumption for each CFM-bin is determined from the product of the average compressor demand and the number of hours in each bin (Equation 7). The sum of the kWh bin values gives the annual consumption (Equation 8).

Equation 7: Energy Consumption of CFM-bin

$$\Delta kWh_{bin1} = (Base\ kW_{operating\_bin1} - Post\ kW_{operating\_bin1}) \times CFM\text{-}bin\ 1\ Hours$$

$$\Delta kWh_{binN} = (Base\ kW_{operating\_binN} - Post\ kW_{operating\_binN}) \times CFM\text{-}bin\ N\ Hours$$

Where:

$Base\ kW_{operating\_bin1}$ = baseline demand at part-load associated with CFM-bin 1

$Post\ kW_{operating\_bin1}$ = post demand at part-load associated with CFM-bin 1

$Base\ kW_{operating\_binN}$ = baseline demand at part-load associated with CFM-bin N

$Post\ kW_{operating\_binN}$ = post demand at part-load associated with CFM-bin N

Equation 8: Total Energy Consumption of All CFM-bins

$$Total\ Energy\ Reduction\ (kWh/yr) = \sum_{o\text{-}n} [\ \Delta kWh_{bin1} + \Delta kWh_{bin2} + \ldots + \Delta kWh_{binN}\ ]$$

Where:

ΔkWh_{bin1} = energy reduction for CFM-bin 1

ΔkWh_{binN} = energy reduction for CFM-bin N

4.6 Impact Evaluation Analysis and Findings

4.6.1 High Level Findings

The Evaluation Team reviewed the distribution of measure types being recommended in energy assessment reports and the implementation conversion rates. Figure 4-1 shows the distribution of energy conservation measures (by category) taken from all reviewed energy assessment reports.[11] HVAC Controls, HVAC equipment, Lighting, and Compressed Air measures were the most prevalent.

Figure 4-1 Distribution of Energy Conservation Measure Recommendations by Measure Category (All Participants)[12]

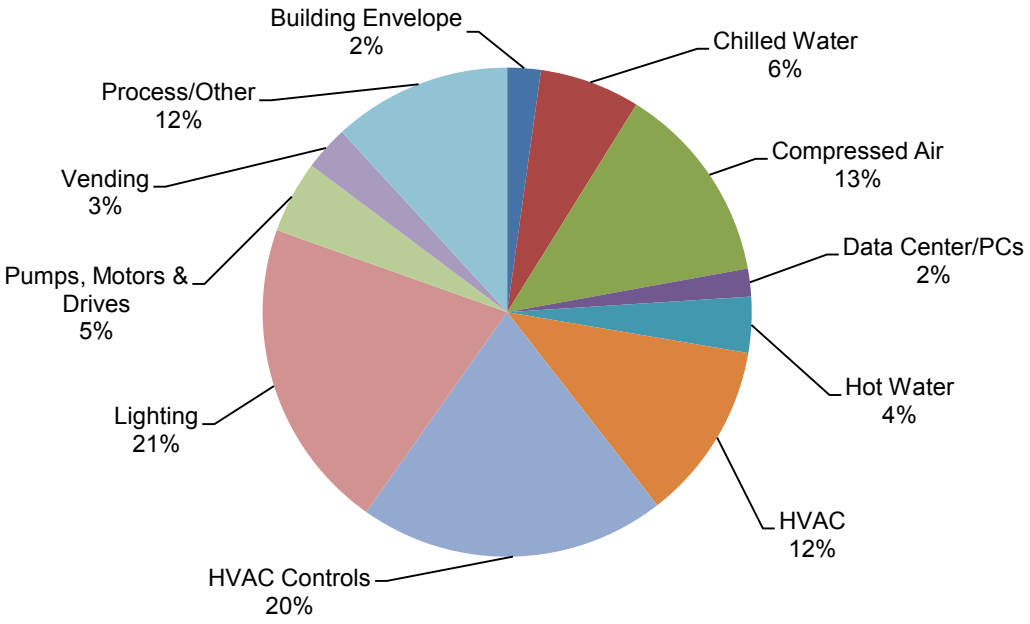


Table 4-5 provides insight into the program-level implementation conversion rate of ECMs identified in the energy assessment reports for the evaluated sample. Participants indicated that measures were implemented through a variety of channels, whether through the Duke $mart Saver Custom Program (12%) or Prescriptive Program (7%) or outside of a DSM program funded fully by the participant ("Spillover", 13%). Several of the surveyed participants also reported that several measures were in the process of being implemented at the time they were surveyed or would be complete by year end 2017 ("Pipeline", 8%). Among the 195 ECMs identified in assessment reports from the evaluation sample, approximately 39% of them have been implemented or will be soon.

[11] Note that the percentages represent the ratio of counted measures assigned to each category in relation to the total number of measures identified collectively in the energy assessment reports. For example, 39 of 195 (20%) of recommended ECMs were HVAC Controls-related.

[12] A figure showing the relative contribution of each category to combined potential energy savings could not be developed as this level of granularity was not uniformly provided in each assessment report. Some energy assessment reports only provided financial savings estimates in dollars, which would need to be converted to energy through the application of utility rates for each given customer at the time that the report was originally drafted. There were also several reports for which energy savings were only aggregated at the whole-facility level making it difficult to dissect the savings retroactively down to the measure level.

Table 4-5 Energy Conservation Measure Report to Implementation Conversion Rate

ECM Category	ECMs	ECM Conversion Rate
Total ECMS Identified in Reports from Evaluation Sample (25 Reports)	195	
Total ECMs Implemented w/ Duke Custom Incentive	23	12%
Total ECMs Implemented w/ Prescriptive Incentive	13	7%
Total ECMs Implemented w/out Incentive (Gross Spillover)	26	13%
Total ECMs In Progress (Pipeline)	15	8%
Total ECMS Implemented	**77**	**39%**

4.6.2 Gross Impacts

The data collected as a result of on-site data measurement and verification activities allowed the Evaluation Team to recalculate energy and demand savings for each sampled project – this is termed “gross verified savings.” The ratio of gross verified savings to the reported savings is the project “realization rate” for each project. For the NR Assessments Program, only those projects involving a Duke Custom Incentive (Custom Incentive Participants) actually have reported energy or demand savings against which verified savings can be compared. Table 4-6 and Table 4-7 summarize the verified savings and realization rates for energy and demand benefits for program years 2014, 2015, and 2016.

Table 4-6 Gross Reported & Verified Energy Savings by Program Year

Program Year	Verified Energy Savings (kWh)	Reported Energy Savings (kWh)	Energy Realization Rate
2014	1,426,881	1,476,881	97%
2015	13,628,164	16,743,918	81%
2016	3,353,765	3,622,062	93%
PY14-PY16	**18,408,296**	**21,842,861**	**84%**

Table 4-7 Gross Reported & Verified Demand Savings by Program Year

Program Year	Verified Summer Demand Savings (kW)	Reported Summer Demand Savings (kW)	Summer Demand Realization Rate	Verified Winter Demand Savings (kW)	Reported Winter Demand Savings (kW)	Winter Demand Realization Rate
2014	167	167	100%	167	167	100%
2015	1,218	1,528	80%	1,195	1,518	79%
2016	449	447	101%	449	447	101%
PY14-PY16	**1,833**	**2,141**	**86%**	**1,811**	**2,132**	**85%**

The low realization rates for energy and demand benefits for Program Year 2015 are attributable to a single, very large hospital site involving extensive HVAC controls upgrades and enhancements to a chilled water plant that had not yet been fully implemented at the time of this evaluation.

As a part of the impact analysis the Evaluation Team also rolled up verified savings and realization rates by measure category for all Custom Incentive Participants from 2014 to 2016. The results of this analysis are shown in Table 4-8. Once again the low realization rate for HVAC Controls is attributable to the single, very large aforementioned hospital project.

Table 4-8 Gross Verified Energy and Average Demand Savings by Measure Category

Measure Category	Verified EnergySavings (kWh)	Energy Realization Rate	Verified Avg. Demand Savings (kW)	Avg. Demand Realization Rate
Compressed Air	1,426,881	97%	167	100%
HVAC Controls	13,402,650	81%	1,432	78%
Lighting	3,578,765	94%	538	102%

The gross energy and demand impacts from Assessment-Only Participant sites with verified spillover savings are summarized in

Table 4-9. Pipeline energy and demand impacts for projects reported to be “still in progress” are presented in Table 4-10. Finally, the combined energy and demand impacts for all three savings categories are provided in

Table 4-11.

Table 4-9 Verified Energy and Demand Spillover Savings for Assessment-Only Participants

Measure Category	Spillover Energy Savings (kWh)	Spillover Demand Savings (kW)
Building Envelope	165,611	19
Chilled Water	51,904	6
Compressed Air	1,100,838	126
Hot Water	365,169	42
HVAC	241,847	34
HVAC Controls	288,230	0
Lighting	187,814	73
Pumps, Motors & Drives	5,826	1
Vending	13,300	0
Total	**2,420,541**	**301**

Table 4-10 Estimated Pipeline Energy and Demand Savings for Projects "Still In Progress"

Measure Category	Pipeline Energy Savings (kWh)	Pipeline Demand Savings (kW)
Compressed Air	763,889	388
HVAC	616,562	134
HVAC Controls	19,203,734	1,344
Lighting	496,015	113
Total	**21,080,199**	**1,980**

Table 4-11 Combined Energy and Demand Impacts (Custom Incentive Participants, Spillover, and Pipeline)

Measure Category	Energy Savings (kWh)	Demand Savings (kW)
Custom Participants	18,408,296	1,845
Assessment-Only Participants	2,420,541	300
Pipeline Projects	21,080,199	1,980
Total Savings	**41,909,036**	**4,125**

5 Net-to-Gross

5.1 Methodology

The Evaluation Team based the net-to-gross evaluation on customer self-report surveys, as described in the Uniform Methods Project, Chapter 23: Estimating Net Savings: Common Practices.[13] The survey was designed based on established methodologies outlined in the Pennsylvania Evaluation Framework.[14] The Evaluation Team interviewed 14 of 36 participating customers, and seven of these customers completed projects through the program, representing 83 percent of the program's gross verified energy savings.

Net-to-gross analysis for this program involved two calculations: freeridership and spillover. The results of these calculations are combined to produce the program-level net-to-gross ratio as follows:

Equation 9: Net-to-Gross Equation

$$NTG = (1 - FR) + SO$$

Where:

NTG = the program-level net-to-gross ratio

FR = the program-level freeridership ratio

SO = the program-level spillover ratio.

The program net verified energy savings are calculated by multiplying the program net-to-gross ratio by the gross verified energy savings resulting from the impact evaluation described in Section 4.

Equation 10: Net Verified Energy Savings

$$kWh_{nv} = kWh_{gv} \times NTG$$

The calculations of the program-level freeridership and spillover ratios are detailed in the following sections.

[13] https://energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf, Section 3.2.

[14] http://www.puc.state.pa.us/Electric/pdf/Act129/SWE_PhaseIII-Evaluation_Framework082516.pdf, Appendix B.

5.1.1 Free Ridership

The evaluation calculated freeridership for each survey respondent based on their answers to a series of questions. These questions collected information on the customers' *intention* prior to interacting with the program and the *influence* of the program on changing those intentions.

Survey respondents were asked how the project would have changed if the assessment and incentive were not available. Responses were scored on a scale from 0 to 50 as shown in Table 5-1. If the respondent indicated they would do a smaller or less efficient project, they are prompted to categorize it as a small, moderate, or large reduction in scope.

Table 5-1 Net-to-Gross Intention Score Methodology

Response	Intention Score
Done nothing	0
Canceled or postponed the project	0
Done a smaller or less efficient project	Small = 37.5 Moderate = 25 Large = 12.5 Don't know = 25
Done exactly the same project	50

To recognize the direct points of influence that the program has on customers' decisions, the survey asked respondents to rate the influence of several aspects of the program. The highest rating for each customer was scored, again on a scale of 0 to 50. The rationale is that if any aspect of the program is highly influential on a customer's decision, then the program overall was equally influential (see Table 5-2).

Table 5-2 Net-to-Gross Influence Score Methodology

Program Aspect	Max Rating → Influence Score
Incentive provided by Duke Energy	0-1 → 50
Interactions with Duke Energy	2 → 43.75
Duke Energy marketing materials	3 → 37.5
Previous experience with Duke Energy programs	4 → 31.25
Contractor or vendor recommendation	5 → 25
Information provided from the Duke Energy assessment	6 → 18.75
	7 → 12.5
	8 → 6.25
	9-10 → 0

The intention and influence scores are added together to produce each respondent's freeridership ratio.

Equation 11: Freeridership Ratio

$$FR_i = \frac{Intention + Influence}{100}$$

The ratio is multiplied by that respondent's verified gross savings to result in free-rider savings, or savings that would have occurred without the program. The program freeridership ratio is the sum of free-rider savings divided by the sum of verified gross savings.

Equation 12: Freeridership Energy Savings

$$FR_p = \frac{\sum(FR_i \times kWh_{gv})}{\sum kWh_{gv}}$$

5.1.2 Spillover

Spillover is an estimate of savings resulting from the installation of energy efficient projects that were completed without a program incentive but that still were influenced by the program. There are two components to arriving at program-attributable savings.

First, the survey collects information on the type of energy-efficiency equipment that was installed but for which an incentive was not received. This is used to estimate energy savings using established calculation methodologies, often a technical reference manual.

Second, the survey asks the respondent to rate the influence of the program on their decision to implement the project despite not receiving an incentive. That score is used to prorate the total project savings, recognizing that the program may not have been the only influence in the completion of the project. The result of this calculation is program-attributable spillover, shown in the following equation:

Equation 13: Program-Attributable Spillover

$$kWh_{aso} = kWh_{gso} \times Influence$$

Where:

kWh_{aso} is the program-attributable spillover savings

kWh_{gso} is the gross spillover savings

Influence is the influence value based on the respondent's rating of the program influence, as shown Table 5-3.

Table 5-3 Participant Spillover Program Influence Values

Reported HEIP Influence	Influence Value
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9
10	1.0
Don't know / Refused	Sector-level measure average

This number is divided by the total verified gross energy savings for the program to produce a program spillover ratio.

Equation 14: Program Spillover Ratio

$$Program\ SO\ Ratio = \frac{\sum kWh_{aso}}{kWh_{gv}}$$

5.2 Net-to-Gross Analysis and Findings

Through self-report surveys implemented with 14 of 36 participating customers, the Evaluation Team found that most customers said they would have done either a smaller project, put off the project, or not done the project at all. Two customers indicated they were planning a similar project within a year. The distribution of responses are shown in Table 5-4. Only 7 of the 14 surveyed customers had completed a project through the program, and 2 of these respondents provided separate answers to this question for different projects they completed. The customers who did not complete a project through the program are not included in the analysis since they do not contribute any savings to the program.

Table 5-4 What Would You Have Done Had You Not Received an Incentive?

Response	Respondents
Done nothing	1
Canceled or postponed the project	1
Done a smaller or less efficient project	5 Large reduction (2) Moderate reduction (3)
Done exactly the same project	2

When asked to rate the influence of the program on their decision to complete the energy-efficiency project, all respondents rated at least one program aspect an 8 or higher on a 0 to 10 scale, where 0 means “not at all influential” and 10 means “extremely influential.” Interactions with Duke Energy, the incentive amount, and information in the assessment report were all rated highly.

The resulting freeridership, spillover, and net savings are shown in the table below. These results indicate that the program is extremely effective in encouraging customers to complete projects they would not otherwise do, and even influenced customers to complete projects based on program information but without providing an incentive.

Table 5-5 Net-to-Gross Results

Savings Category	Gross Verified Energy Savings (kWh)	Net Verified Energy Savings (kWh)	Ratio
Net of Free-ridership	15,255,745	14,798,073	0.97
Program-influenced Spillover	18,408,296	1,656,746	0.09
Net-to-Gross	18,408,296	19,512,794	1.06

** Net of Freeridership = (1 – 0.03 FR) = 0.97*

6 Process Evaluation

6.1 Summary of Data Collection Activities

Process evaluation activities are designed to support continuous program improvement by identifying successful program elements that can be expanded or built upon as well as underperforming or inefficient program processes that could be holding back program performance. The data collection activities for the process evaluation of the NR Assessments Program included a database review, and interviews with key contacts involved in program operations, participating customers, and contractors and trade allies that identify project opportunities.

6.1.1 Program Staff and Database Review

An interview was conducted with Duke Energy program staff to improve the Evaluation Team's understanding of the program and to get background information on program design and implementation practices that assisted in the design of the interview guides and surveys for on-site evaluators and customers. The program staff provided valuable feedback on how the program operates and changes that have been made or will be made to the program.

In addition to the program staff interview, the Evaluation Team reviewed the program tracking database. The database review was used to ensure the necessary data and information was being collected to track program progress.

6.1.2 Trade Allies

Interviews were completed with all four implementation vendors. These vendors are responsible for conducting the onsite assessments and providing customers with an assessment report outlining energy saving opportunities. Discussion topics included program awareness among customers, program guidelines and processes, interactions with customers, and suggestions for improving the program.

6.1.3 Participants

The Evaluation Team conducted in-depth interviews with program participants. Program participants were defined as customers who received an assessment through Duke Energy's NR Assessment Program. Interviews were conducted with program participants in January and February 2017. Interviews focused on customers' experience with the program, sources of awareness, satisfaction with various aspects of the program, energy efficiency recommendations they have implemented, and any additional actions they have taken since the assessment. Interviews were completed with 14 of 36 program participants who received an assessment from 2014 to 2016. Table 6-1outlines the participant response for the evaluation.

Table 6-1 Participant Response Rate

Participant Response	Qty Participants
Starting Sample	36
Does not recall participating	1
New owners	1
No one knowledgeable	2
Opted out	3
Refusal	0
Attempted, but not completed	15
Completes	**14**
Response Rate (Complete/Starting Sample)	**39%**

6.1.4 Non-Participants

Telephone surveys were conducted with customers who expressed interest in having an assessment done at their facility, but ultimately did not have a Duke Energy assessment. These customers are defined as being Non-Participants. Telephone surveys were conducted between January, 2017 and February, 2017. Survey questions focused on their interactions with program staff, sources of awareness, satisfaction with various aspects of the program they experienced, energy efficiency improvements implemented, and reasons for not having an assessment completed. Surveys were completed with six of the 17 non-participating customers identified as expressing interest in the program but not having an assessment completed from 2014 to 2016 (see Table 6-2).

Table 6-2 Non-Participant Telephone Survey Response Rate

Non-Participant Response	Non-Participant
Starting Sample	17
Does not recall participating	0
New owners	0
No one knowledgeable	2
Opted out	0
Refusal	3
Attempted, but not completed	6

Non-Participant Response	Non-Participant
Completes	**6**
Response Rate (Complete/Starting Sample)	**35%**

6.2 Process Evaluation Findings

6.2.1 Program Staff and Database Review

The program staff interview was extremely useful in helping the Evaluation Team understand how the program operates. Information from the staff interview has been used throughout the findings section to add context around respondent answers.

An additional part of the evaluation activities included reviewing the program database to ensure the necessary information needed to track the program and conduct evaluation activities existed. Program staff use the tracking database to document customers who expressed interest in the program as well as customers who received an assessment and any projects that were completed and received a Smart $aver Custom incentive.

The Evaluation Team utilized this same database to pull the sample for the impact and process evaluation activities. When pulling information for evaluation purposes, the staff was knowledgeable about the information included in the file although some areas were not electronically documented. Specifically, the status of projects was not always kept up to date, making evaluation efforts difficult in understanding which customers had reached out to Duke Energy but were deemed ineligible, which customers received an assessment, and which customers had received a Smart $aver Custom incentive. Understanding which customers received a Custom incentive is critical in understanding how the program is doing when compared to program goals. Furthermore, understanding which customers went on to receive a prescriptive rebate would be useful to track within the NR Assessment program. Knowing which customers have made improvements based on the assessment report could be useful to account managers and vendors who conduct follow-up discussions with customers.

In conducting the impact evaluation, the tracking database excluded the raw claimed project-level savings (pre-realization rate gross savings without losses). This information is necessary to understand the project-level savings to be able to verify savings figures. The tracking system also did not identify the measures that were incentivized through the program. This information was only available by reviewing project calculations.

In conducting the process evaluation telephone efforts, there were times the contact information associated with some participants was out of date. Given the evaluation activities went back to 2014, some level of personnel turnover at companies is expected, resulting in having contact information for someone who is no longer with the company. That said, for the participant interview effort, the Evaluation Team found two cases where there was Duke Energy contact

information associated with the customer. Ensuring contact information is kept up to date will support follow-up efforts for either scheduling assessments or following up once an assessment has been completed.

6.2.2 Trade Allies

As part of the process evaluation, the Evaluation Team interviewed the four vendors involved in conducting assessments at customer's businesses. The time these vendors have been involved in the program vary from two to eight years, with one vendor being involved from the predecessor program (Smart Building Advantage).

6.2.2.1 Communication

Staff with each vendor talked about having open lines of communication with staff from Duke Energy. Regular bi-weekly conference calls occur for the program, which have been working well with Duke Energy staff being responsive to any questions. These meetings focus on the status of individual projects, any additional projects in the pipeline and status of incentives. Additional communications are had as needed and are typically via email or telephone calls. Large account managers are also included in conversations when it applies to the customers they oversee.

Duke typically makes changes to their program once per year, generally in January. These changes are typically provided to the vendors, although at least one mentioned they would like the changes discussed with the vendors so they are proactively made aware of the changes and rationale for the change. Another vendor talked about having to check the Duke Energy website for program changes rather than hearing about the changes directly from Duke Energy.

6.2.2.2 Customer Interaction

Interaction with the customer has typically been initiated by Duke Energy. Only recently (in 2016) has the program begun to be marketed with some vendors doing their own outreach to bring customers to the program. Once a customer has been identified there is typically an initial conversation, either in person or via conference call. Part of the initial discussion is to understand the goals the customer has as well as their building operations and use. An onsite visit is then performed, focusing on the customer's goals for the assessment. This could be focused on specific equipment or parts of the building or the entire building operations. Once the assessment is completed, the vendor produces a report, which documents the energy savings opportunities and recommendations. The report is provided to the customers either in person or remotely. All vendors indicated they prefer to meet in person after the report is generated to discuss the results. As part of the in-person meetings, the vendors discuss the Smart $aver Custom program and the process to receive rebates, if that has not already been discussed. The most important part of these discussions is having both the decision makers as well as the operations staff in the room as the recommendations and incentives are being discussed. Both vendors and Duke Energy program staff recommend having the decision makers hear the recommendations as well as the potential savings as a way of getting energy efficient projects scheduled quicker.

Once the assessment report has been delivered, vendor activity varies. Two vendors indicated everything beyond the assessment report is not through the Duke Energy program while another vendor indicated they assist the customer in completing any rebate paperwork. This follow-up is important in keeping customers engaged and utilizing the Duke Energy programs. Ensuring follow-up is being done and communicated to the parties involved will help convert assessments into projects. This communication needs to reach all levels of the customer organizations, since senior management as well as more technical contacts are both involved in implementing projects, whether allocating budget and approvals or specifying equipment needs.

Similar to customer feedback, vendors agree that budget and available capital are the main reasons customers do not follow through with recommendations. One vendor also went on to say the time the customer has available to pursue projects was another big issue. While this was mentioned by one vendor, at least two mentioned how they work with customers if they have questions about the rebates and incentives available from Duke Energy. With both custom incentives and prescriptive rebates available, some customers are confused about the requirements of each and the timeline associated with the custom incentives. Shortening the timeline for custom incentives was recommended by one vendor to help with this process. Including Duke Energy account managers can also help reach additional contacts in customer organizations.

6.2.2.3 Future Opportunities

As mentioned by both Duke Energy staff and the vendors, one of the biggest challenges for the program is keeping projects in the pipeline. One suggestion vendors had was to increase the marketing of the program. Keeping customers aware of the program and its value will encourage uptake in the program. With marketing campaigns fully starting in 2016, the program may see additional leads being generated.

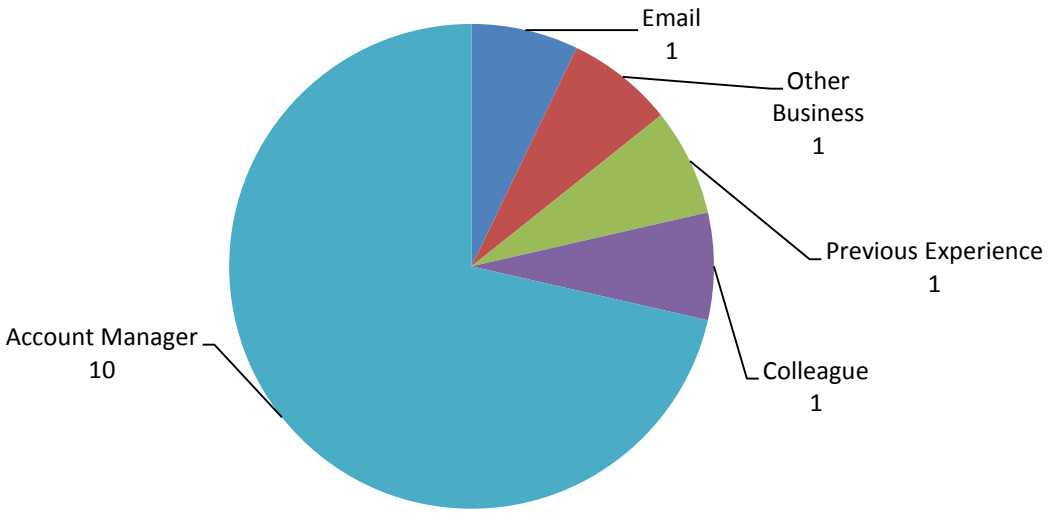
6.2.3 Participants

Interviews were conducted with program participants, customers who completed an energy assessment through the Duke Energy Non-residential Assessment Program. This section provides the detailed findings from the 14 completed interviews.

6.2.3.1 Marketing Practices

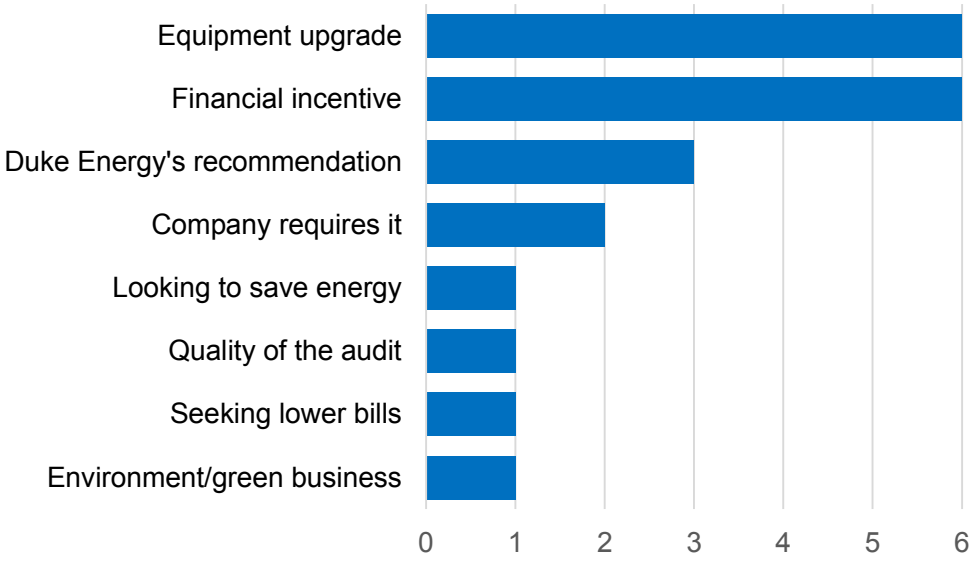
Prior to 2016, the program largely focused on account managers as the primary source of program promotion. In 2016, a marketing campaign was put together which included direct mailings. Additional promotional activities have also occurred, such as including the program in newsletters. When asked how they heard about the program, most participant respondents (ten out of 14) listed their account representative or another contact at Duke Energy as the primary source of awareness of the NR Assessments Program, which is consistent with how the program was marketed. Figure 6-1 shows the awareness sources for all 14 respondents.

Figure 6-1 Participant Source of Program Awareness



Program marketing materials note that the NR Assessments program gives customers “the power to take control of your building’s energy consumption. Whether you need to drive down operational costs, increase efficiency, meet corporate sustainability goals or address aging infrastructure, Duke Energy’s assessments will help identify areas for improvement. ” When respondents were asked what made them decide to have an assessment through the NR Assessments Program, most of these items were mentioned. The top reasons cited included the need to upgrade equipment at the facility (six respondents), the financial incentive offered (six respondents), and Duke Energy’s recommendation (four respondents). Other reasons are included in Figure 6-2.

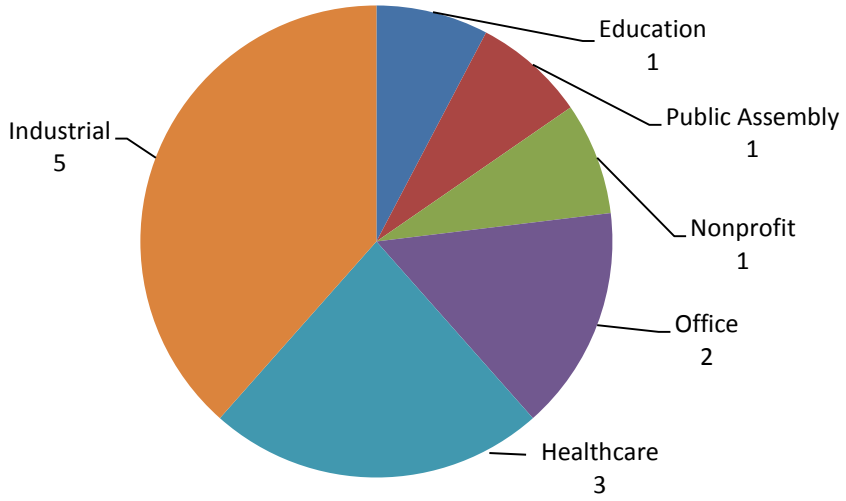
Figure 6-2 Reasons Respondents Cited for Participating in Non-Residential Assessment Program



6.2.3.2 Participating Customer Characteristics

Of the 14 participant respondents, the majority of the respondent facilities were industrial (five respondents). Other common facility types included healthcare (three respondents) and office (two respondents). Figure 6-3 shows the distribution of industries covered by the respondent facilities. These facility types are consistent with how the program was marketed, which initially targeted larger industrial customers.

Figure 6-3 Non-Residential Assessment Program Participant Industries



Participants were asked how their companies make budget decisions and whether they were decided locally, regionally, nationally, worldwide or something else. Most respondents (nine) reported that decisions are made either locally or regionally. One reported that decisions are made nationally, and two reported decisions are made on a global level. Two respondents said it would depend on the project.

Participants were also asked how far into the future their companies plan when creating budgets and financial plans. Over half of respondents (eight) stated that they plan five years into the future. Two respondents said they planned one year and three said they planned more than five years into the future. In addition, one respondent said they budgeted one year into the future, but had financial plans out to five years.

Twelve of the fourteen respondents said that their business production schedule or business cycle affects when they can implement energy efficiency projects. When asked for more details, two said capital projects are started at the beginning of their budget year, one said their business was largely dependent on the market, one said projects are typically seasonal, and another said they had to plan shut-down times for any new projects.

When asked what simple payback period their business would need to achieve in order to undertake an energy efficiency project, eight respondents provided answers between two and four years, and three said it would depend on the project or the client. Three respondents did

not report a payback period.

6.2.3.3 Recommendation Status

As Figure 6-4 shows, 11 of the 14 participant respondents completed at least one recommendation made through the assessment. All 11 respondents mentioned they completed the project because it was recommended from the assessment report. Seven of these applied for incentives through Duke Energy and six reported receiving a Duke Energy incentive (custom or prescriptive incentive). One applicant was deemed ineligible to receive an incentive due to the fact that the installed equipment was not new, but had been refurbished. Four of the incentive recipients said they also have plans to complete at least one additional project in the future. Two of these respondents plan to apply for incentives through Duke Energy for those projects as well.

Figure 6-4 Number of Respondents Who Completed Assessment Recommendations

Participants who made improvements based on assessment recommendations but did not apply for Duke Energy incentives cited various reasons. Two participant respondents mentioned the time it takes to apply for custom incentives with one mentioning they looked at the prescriptive rebates but did not find any that would work. One respondent lacked the awareness of incentives for the recommended measures. The last respondent indicated the program rider fee was larger than the incentive they would have received making it more costly to apply for the rebate.

For customers who still have recommendations to follow-through on, respondents cited several reasons for not completing the improvements. Typical responses included the following:

- Financial incentives were not adequate (two)
- Internal delays (two)
- Concern over business impacts of recommendations (one)
- Concern over environmental impacts of recommendations (one)
- Equipment limitations (one)

- Preference for other equipment (one)
- Recommendations were too numerous and complex to implement all (one)

For the three participants who did not complete any recommendations, one said they were still in the review process and developing a plan to implement a recommendation, but they have yet to determine if the return on investment will be good enough to proceed with the project. Another Participant indicated they have been focusing their efforts on another facility so they have not moved forward with anything yet. The third respondent indicated their building is currently up for sale so any improvements are in a holding pattern.

When asked what Duke Energy could do to encourage them to complete additional recommendations, two respondents stated that savings would have to be high enough to justify any additional expense. In total, three respondents noted that they only opt-in to the program rider when they have an improvement planned.

6.2.3.4 Program Satisfaction

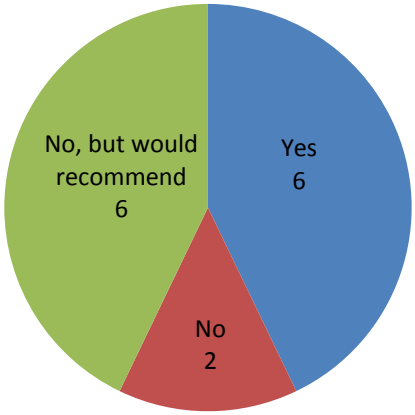
Overall, program participants were highly satisfied with the Non-Residential Assessment program. Respondents were asked to rate their overall experience with the program and different program components on a scale of 0 to 10, where 0 is “very dissatisfied” and 10 is “very satisfied.” All program aspects were rated an average of 8.0 or higher. Additionally, respondents rated their overall satisfaction with the program highly overall (9.0 out of 10.0) and rated Duke Energy highly as their service provider (8.8 out of 10.0) (see Table 6-3).

Table 6-3 Non-Residential Assessment Program Participant Satisfaction

Program Aspect	Mean Satisfaction
Overall satisfaction with the program	9.0
Satisfaction with Duke Energy	8.8
The services performed by the auditor	9.3
The level of detail provided in the assessment report	9.2
The equipment and building systems review	9.1
Interactions with Duke Energy staff	9.1
The overall process of receiving the assessment from Duke Energy	9.1
The recommendations provided	8.7
The staff time it took to submit the application and necessary paperwork	8.6
The cost of the assessment	8.5
The application process	8.0

As another gauge of satisfaction, customers were asked if they have recommended the program to others. As shown in Figure 6-5, six participants reported that they had recommended the program. If provided the opportunity, another six respondents said they would recommend the program. Of the two who would not recommend the program, one respondent said it was not his responsibility to make recommendations and the other did not elaborate as to why.

Figure 6-5 Have You Recommended the Program to Others?



When asked about the aspect of the program they liked best, respondents' top rated aspect of the program included the audit report (four respondents). The incentives were the second most cited aspect mentioned by three respondents. Other important factors included the analysis performed by the auditor and working with the contractor or auditor (two respondents each). Other responses are listed in Figure 6-6.

Figure 6-6 What Part of the Non-Residential Assessment Program Did You Like Best?

When asked what they would change about the NR Assessments Program, two participants asked for larger incentives, which is a common response to energy efficiency programs. Other responses included requests for an incentive approval timeline and more recommendations (one respondent each). The respondent who wanted more recommendations said they were somewhat disappointment by the lack of savings opportunities identified and that it would have been helpful to verify opportunities prior to conducting a full assessment.

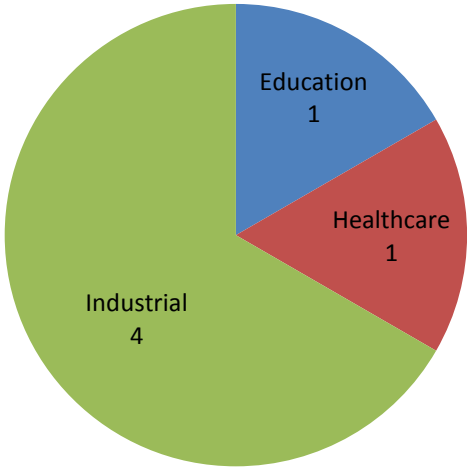
6.2.4 Non-Participants

The Evaluation Team completed six interviews with Non-Participants who had initiated contact with the Non-Residential Assessment Program, but had not completed an assessment. Questions for non-participant respondents focused on reasons for not having an assessment and their satisfaction with the aspects of the program they were involved in.

6.2.4.1 Non-Participant Customer Characteristics

Similar to the participants, a large portion of respondents (four) represented industrial facilities. Again, this is consistent with how the program was initially marketed, which was through account managers. Other facility types are shown in Figure 6-7.

Figure 6-7 Non-Residential Assessment Program Non-Participant Industries



Non-Participants were asked how their companies make budget decisions and whether they were decided locally, regionally, nationally, worldwide or something else. Half of the respondents (three) reported that decisions are made locally. One said decisions are made regionally, one said decisions are made nationally, and one said it would depend on the budget of the project.

Participants were also asked how far into the future their companies plan when creating budgets and financial plans. Half of the respondents (three) stated that they plan one year into the future. One respondent said they planned four years and two said they planned five years into the future.

Five of the six respondents said that their business production schedule or business cycle affects when they can implement energy efficiency projects. When asked for more details, two respondents said their work was seasonal, while three said they have to schedule any equipment shut-downs in advance due to a busy manufacturing cycle.

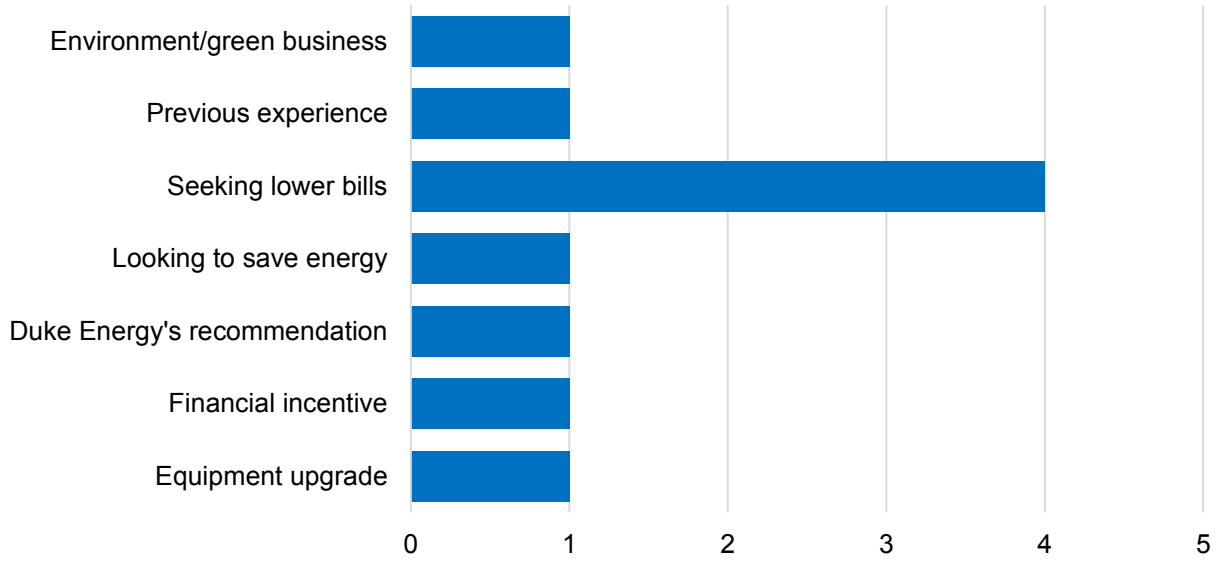
When asked what simple payback period their business would need to achieve in order to undertake an energy efficiency project, three respondents reported a one-year payback, one reported a two-year payback, one reported a three-year payback, and one reported a ten-year payback.

6.2.4.2 Marketing Practices

Similar to Participants, Non-Participants were asked to name the source of program awareness, with two of them naming a colleague, one naming a conference they attended, and three naming a Duke Energy staff member or an account representative.

Non-Participants were also asked why they considered having an assessment through Duke Energy's NR Assessments Program. Similar reasons were identified with over half (four respondents) mentioning they had been seeking to lower their utility bills. Additional reasons were also mentioned such as previous experience with Duke Energy and the financial incentive. All reasons provided by Non-Participants are listed in Figure 6-8.

Figure 6-8 What Made You Consider Having an Assessment Through Duke Energy's Non-Residential Assessment Program?



Non-Participants, as defined in the process evaluation, were customers who ultimately did not have an assessment complete. When asked why they chose not to participate in the Non-residential Assessment Program, the most common response was that the cost of the assessment and program rider was not worth the expense to their business (five respondents). In addition, two respondents made arrangements with Clemson University's audit program, as there was no fee involved in that specific audit program. Another noted the time requirement was burdensome and they had conflicting priorities.

6.2.4.3 Program Satisfaction

Non-participant respondents were asked about the steps they had completed through the program and their satisfaction with each of those that they had completed. Table 6-4 shows the average satisfaction of Non-Participants on a scale of 0 to 10, where 0 is “very dissatisfied” and 10 is “very satisfied.”

Table 6-4 Non-Participant Program Steps Completed and Mean Satisfaction Rates

Program Step Completed	Respondents	Mean Satisfaction
Initial call with program staff	4	7.3
Completed the online applications	1	6.0
Received a proposal letter	5	6.6
Preliminary walkthrough	3	8.0
Kickoff call with Duke	2	7.0
Schedule the onsite assessment	1	8.0

Non-Participants were asked what Duke Energy could have done differently so that they would have completed an assessment. Responses included the following:

- More affordable assessment pricing (three respondents)
- More involvement from Duke Energy/account representative (two respondents)
- Ability to break down cost over multiple billing cycles (one respondent)
- In-person meetings rather than conference calls (one respondent)

All six Non-Participants had made energy efficiency improvements on their own in the last two years. Energy efficiency projects included lighting (four respondents), chillers (two respondents), variable frequency drives (two respondents), air compressors (1 respondent), and roofing (one respondent). Furthermore, five of the non-participant respondents planned to make energy efficiency improvements during the next two years. These future projects are likely to include lighting (three respondents), HVAC (one respondent), exhaust systems (one respondent), process equipment (one respondent), chillers (one respondent). Three of the Non-Participants said they planned to participate in a Duke Energy program to complete the improvements.

Overall, Non-Participants were split on their satisfaction with Duke Energy as their service provider, ranking the company a 6.8 on a scale of 0 to 10, with where 0 is “very dissatisfied” and 10 is “very satisfied.” Three stated they were satisfied and with Duke and included the following praise:

They have bent over backwards to cut the price [of the assessment].

We have relatively reliable power.

Two Non-Participants discussed some issues they had with Duke Energy as reasons for dissatisfaction. One noted that the price of opting in to the program was high, while another said they have had issues getting rebates issued in the past.

7 Conclusions and Recommendations

7.1 Impact Evaluation

Conclusion 1: Trade allies had to be approached directly by the Evaluation Team in order to obtain final versions of any ex ante building energy simulation models used to develop energy savings estimates as part of the energy assessment. Our team was able to retrieve this information from one of two trade allies, but it would have been advantageous for the NR Assessments Program to have copies of this information readily available for the evaluator.

- **Recommendation 1:** We recommend that trade allies provide final versions of all modeling files whenever a whole building energy simulation approach is used as the primary source for generating project-level energy and demand savings estimates. This practice would improve evaluation efforts of the program.

Conclusion 2: Assessment report formats varied from trade ally to trade ally. Some variability in reporting format is to be expected, especially in instances where a study only focuses on a specific building system, but improvements can be made with regard to benchmarking reporting content. As an example, all reports should provide savings estimates in units of energy (kWh), demand (kW), and dollars. There were several reports that only included estimated financial energy savings ($). It should also be noted that there were four Custom Incentive Participants that didn't actually receive a comprehensive energy assessment report. Instead they were provided with the results from energy simulation models developed by the *Building Intelligence Group* along with a two-page description of the recommended ECMs. This made the evaluation of reported savings more challenging.

- **Recommendation 2:** Develop standardized reporting template(s) or a benchmark document identifying required content to be included in each energy assessment report.

- **Recommendation 3:** We recommend that trade allies are encouraged to provide key inputs and assumptions used in engineering calculations used to estimate measure-level savings.

Conclusion 3: There are several opportunities for improvement for tracking NR Assessment Projects.

- **Recommendation 3:** The Evaluation Team has several recommendations for how to improve assessment project tracking processes.

    - We recommend that the program develop a means for linking NR Assessment projects with subsequent Custom or Prescriptive Smart $aver incentive applications and payments. This would eliminate the need to cross-reference participant databases for the NR Assessments, Custom, and Prescriptive

Programs. There were two instances during the evaluation when the Evaluation Team discovered that a participant had received a financial incentive from the Duke Custom Program, but had not been identified by the program management as a Custom Incentive Participant.

- We recommend updating project status (incentive offered, incentive paid, report complete, etc.) in the master tracking system on a more frequent (monthly) basis. The true participation status of each customer in the tracking database was not fully-understood until the Program Manager provided updated information via a follow-up data request.

- We recommend that the Program track additional project details including the ECMs identified in each assessment report, estimated measure-level energy and demand savings impacts, and incentives paid to the Customer through the Duke Custom or Prescriptive Programs following an assessment. Adopting these practices would make the process of tracking projects more efficient.

7.2 Process Evaluation

Conclusion 1: One of the main reasons customers did not follow-through after expressing interest was because of the fee associated with the assessment. Customers are not necessarily aware of the different levels of assessments or the fees associated with them. As a result, they go to other sources (i.e., a local university) to have a study done. Making customers aware of the services Duke Energy provides, both for assessments and rebates, may encourage use of Duke Energy program offerings.

- **Recommendation 1:** Increase program marketing so customers are aware of the different levels of assessments and are aware of the rebate and incentive programs.

Conclusion 2: One of the key aspects to an evaluation program is customer follow-through once an assessment is completed. This process could take up to a few years if customers need budget approval to move forward. Given this, it is important to continually follow-up with customers who received an assessment to make sure they are aware of the rebates available at the time they decide to move forward with their project. The process for this follow-up needs to be clear and all parties involved, including account managers, should remain updated. Although not specifically identified as one of their goals, account managers could follow-up with customers who received an assessment to encourage rebate program use. While a portion of vendor compensation is tied to implementation, one vendor specifically mentioned how there is no program requirements once an assessment report is delivered and a second indicated they do not do any follow-up.

- **Recommendation 2:** Ensure processes are in place for follow-up once an assessment is complete. This includes having account managers follow-up on accounts that received an assessment to answer any questions and to encourage and assist in project

completion.

- **Recommendation 3:** Continue to keep Account Managers informed and involved in the assessment process and project status.

Conclusion 3: The program currently tracks savings based on customers who received an assessment and received a rebate through the Smart $aver Custom program. If a customer who received an assessment made an improvement but went through the prescriptive program, the participation is tracked through the prescriptive program. Tracking customers who received prescriptive rebates within the Custom program would allow account managers and others to focus follow-up efforts on customers who have not followed through with any recommendations.

- **Recommendation 4:** Within the Custom program, track customers who receive prescriptive rebates and custom rebates.

Conclusion 4: It is not uncommon for program staff to make program changes throughout the program's lifecycle. These changes typically occur at the start of each program year, although changes can occur at any time. When changes are made to the program, it is important to notify vendors of the changes (ideally before the changes are made) so they are providing customers with accurate information.

- **Recommendation 5:** Proactively communicate program changes with vendors.

Appendix A - Summary Form

Appendix B - Per Energy Assessment Impact Results

Appendix C - Participant IDI Guide

Appendix A Summary Form

Smart $aver Program

Completed EMV Fact Sheet

Description of program

The Non-Residential Assessment Program helps Duke Energy commercial customers in North Carolina and South Carolina find energy saving opportunities within their businesses by subsidizing a portion of the cost of an energy assessment. Energy assessments are that identify energy conservation opportunities, that – when implemented – can assist in lowering energy costs.

Date	April 15, 2017
Region(s)	North Carolina South Carolina
Evaluation Period	January 1, 2014 – December 31, 2016
Total kWh Savings	18,408,296 kWh
Per Participant kWh Savings	2,629,756/assessment
Coincident kW Impact - Summer	1,833 kW
Coincident kW Impact - Winter	1,811 kW
Net-to-Gross Ratio	106%
Process Evaluation	Yes
Previous Evaluation(s)	N/A

Evaluation Methodology

Impact Evaluation Activities

- *13 on-site verifications*
- *3 desk reviews*
- *Analysis of 32 unique measures*

Impact Evaluation Findings

- *Realization rate = 84% for energy impacts; 86% for summer demand impacts; 85% for winter demand impacts*
- *Net-to-gross ratio = 1.06*

Process Evaluation Activities

- *Trade Allies; 4 telephone surveys*
- *Participants; 14 telephone surveys*
- *Non-participants; 6 telephone surveys*

Process Evaluation Findings

- *Satisfaction with the program overall is high among participants and nonparticipants*
- *Cost is the main reason participant and non-participant respondents wanted an assessment*
- *Cost was the main reason why nonparticipant respondents cited for not moving forward with an assessment*
- *The primary source of program awareness is from Duke Energy, specifically the account managers*
- *The transition to the online portal has been challenging for trade allies.*

Appendix B Per Energy Assessment Impact Results

Table A-1 Program Years 2014 – 2016 Verified Impacts by Program Year

Program Year	Gross Energy Savings per EA Report (kWh)	Gross Summer Coincident Demand per EA Report (kW)	Gross Winter Coincident Demand per EA Report (kW)	Free Ridership	Spillover	Net to Gross Ratio
2014	1,426,881	167	167	0.97	0.09	1.06
2015	2,725,633	244	239	0.97	0.09	1.06
2016	3,353,765	449	449	0.97	0.09	1.06

Appendix C Duke Energy Non-Residential Assessment Program Customer Survey Guide

Sample Variables

CONTACT NAME Primary customer contact name

MEASURE Summary of project measure implemented

YEAR The year the measure was completed and paid

ADDRESS The address of the site where the measure was installed

INCENTIVE The amount of the incentive paid for the measure

CONTRACTOR Flag that customer worked with external contractor
- 1 Worked with contractor
- 0 Implemented within company

TYPE Type of customer
- 1 Assessment and installation
- 2 Assessment only
- 3 Expressed interest but no assessment

Introduction and Screening
Hello, my name is [NAME], and I am calling on behalf of Duke Energy. May I speak with [CONTACT NAME]?

I'm calling from Tetra Tech, an independent research firm. We were hired by Duke Energy to talk with some of their customers about their participation in the Non-residential Assessment Program.

Our records indicate that in [YEAR] you participated in Duke Energy's Non-residential Assessment Program. An engineering firm came to your business at [ADDRESS] and conducted an energy assessment of your facility and provided you with a report recommending energy efficiency measures. Is this correct?

Yes
No (what is not correct? If did not receive an assessment (type = 3), terminate)

If needed:
Is it possible that someone else in your organization would be more familiar with the program or the assessment that was completed?

Were you involved in the decision to complete the assessment?

Great, thank you. I'd like to assure you that I'm not selling anything, I would just like to ask your opinion about this program. Your responses will be kept confidential and your name will not be revealed to anyone. For quality and training purposes, this call will be recorded.

Program Awareness and Marketing

Q1 How did you first hear about Duke Energy's Non-residential Assessment Program? (Select one)

1 Account representative
2 Business Energy Advisor
3 Contractor / Vendor [CONTRACTOR = 1]
4 Email from Duke Energy
5 Mail from Duke Energy
6 Colleague/Another business
7 Conference/Trade Show/Expo
8 Duke Energy website
9 Other (specify)

Assessment Details

Q10 What made you decide to have an assessment done through Duke Energy's Non-residential Assessment Program?

Q11 Did you complete any of the recommendations on your assessment report?

If yes

Did you complete the energy efficiency projects because it was recommended by the Duke Energy assessment?
What projects have you done that were recommended in the report?
Did you apply for an incentive from Duke Energy for the recommendation?

If yes: Did you receive an incentive from Duke Energy for this project?
Do you have plans to complete any additional improvements based on the recommendations from the assessment report?
If no: What factors influenced your decision not to apply? What could the program do to encourage you to apply for incentives from Duke Energy's Smart Saver custom and prescriptive programs?

If no

Do you have plans to complete any improvements based on the recommendations from the assessment report in the future?

If yes: What could Duke Energy do to encourage you to complete the recommendation through a Duke Energy program?
If no: What could Duke Energy do to encourage you to complete the recommendation through a Duke Energy program?

Q12 Are there any recommendations you have not completed?

If yes
Do you have plans to move forward with the others?
Do you plan to apply for an incentive through Duke Energy's Smart Saver custom and prescriptive programs? (if no, why not?)
What could Duke Energy do to encourage you to complete additional projects?
Why did you move forward with some recommendations but not others?

Q13 Using a scale from 0 to 10, where 0 is not at all valuable and 10 is very valuable, how valuable was the *assessment report* you received from Duke Energy?

Q14 How could the assessment report be improved to be more valuable?

Q15 Using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied are you with the following aspects of the assessment? [ROTATE a-h]

a. The level of detail provided in the assessment report?
b. The recommendations provided?
c. The equipment and building systems reviewed?
d. Interactions with Duke Energy staff?
e. The application process?
f. The services performed by the auditor?
g. The staff time it took to submit the application and necessary paperwork?
h. The cost of the assessment?
i. The overall process of receiving the assessment from Duke Energy?

Q16 [IF any in Q15<=3] Is there anything the program could do to improve the assessment process?

Net-to-Gross
(TYPE = 1, receive Duke Energy prescriptive/custom rebate)

[if TYPE = 2] SKIP TO SAT1

FINTRO Now I would like to ask you some questions about the [MEASURE] project you completed following your assessment.

F1 Would your business have completed a similar assessment on your own if you had not received the assistance from Duke Energy?

1 Yes
2 No

F2 Which of the following is most likely what would have happened if you had not received the assessment and incentive from Duke Energy for the [MEASURE]?

1 Done nothing
2 Canceled or postponed the project at least one year
3 Done a smaller or less efficient project within a year (By how much would you have reduced the size, scope, or efficiency of the project? Would you say a small amount, moderate amount or large amount?)
4 Done exactly the same project within a year (Would your business have paid the additional [INCENTIVE AMOUNT] to complete the project on your own?)
5 Don't know

F3 On a scale of 0 to 10, with 0 being "not at all influential" and 10 being "extremely influential", how would you rate the influence of the following factors on your decision to have an assessment and complete the project? [randomize list]

a. The incentive provided by Duke Energy
b. The interaction with Duke Energy program representatives
c. Information from Duke Energy's marketing materials
d. Previous experience with a Duke Energy program
e. Your contractor or vendor's recommendation
f. The information provided from the assessment from Duke Energy

F4 Were there other factors we have not discussed that were influential in your decision to have an assessment and complete the recommended improvements?

1 Yes (What were those other factors?)
2 No

SP1 Since your participation in the Non-residential Assessment Program, did you complete any additional energy efficiency projects at this facility or another facility served by Duke Energy that did not receive an incentive through a Duke Energy program? This includes projects that you did on your own as well as projects that were recommended by the assessment.

1 Yes
2 No
3 Don't know
4 Refused

SP2 What type of energy efficient products, equipment, or improvements did you install or implement? (Select all that apply)

1 Lighting
2 Heating/Cooling systems
3 Hot Water
4 Appliances/Office Equipment
5 Insulation
6 Motor/Variable Frequency Drives (VFDs)
7 Compressed Air
8 Refrigeration

9 Something else
10 Don't know

[ASK SP3-SP5 FOR EACH MENTIONED IN SP2]

SP3 Can you describe the [SP2] equipment?

[FOR EXAMPLE: What was the brand or model? Efficiency rating? Dimensions? Capacity? Quantity?]

SP4 [IF SP2 <> 5, "How many" or IF SP2=5, "How much"] [SP2] did you install?

SP5 Was the [SP2] project recommended by the assessment?
1 Yes
2 No

SP6 On a scale of 0 to 10, with 0 meaning "not at all influential" and 10 meaning "extremely influential", how influential was your participation in the Non-residential Assessment Program on your decision to complete the additional energy efficiency project(s)?

Customer Satisfaction

SAT1 What part of the Non-residential Assessment Program did you like best?

SAT2 What would you change about the Non-residential Assessment Program, if anything?

SAT3 Have you recommended the Non-residential Assessment Program to anyone?

1 Yes
2 No (If you had the chance, would you recommend the Non-residential Assessment Program to anyone?)
3 Don't know (If you had the chance, would you recommend the Non-residential Assessment Program to anyone?)

X1 Considering all aspects of the program, using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how would you rate your overall satisfaction with the Non-residential Assessment Program?

X2 [IF x1<=3] Why do you say that?

X3 Using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied are you overall with Duke Energy as your service provider?

X4 Why do you say that?

Customer Characteristics

C1 What is the main business activity at [ADDRESS]?

1 Office/Professional
2 Warehouse or distribution center
3 Food sales
4 Food service
5 Retail (other than mall)
6 Mercantile (enclosed or strip malls)
7 Education
8 Religious worship
9 Public assembly
10 Health care
11 Lodging
12 Public order and safety
13 Industrial/manufacturing (DESCRIBE)
14 Agricultural (DESCRIBE)
15 Vacant (majority of floor space is unused)
16 Other (DESCRIBE)
17 Don't know

C2 Are your company's budget decisions made locally, regionally, nationally, worldwide, or something else?

1 Locally
2 Regionally
3 Nationally
4 Worldwide
5 Other (specify)
6 Don't know

C3 When creating budgets and financial plans, how far into the future does your company plan?

0 Less than 1 year
1 One year
2 Two years
3 Three years
4 Four years
5 Five years
6 More than 5 years
7 Other (specify)
8 Don't know

C4 Does your business' production schedule or business cycle affect when you can implement energy efficiency projects?

[PROBE: A business cycle refers to time periods when your business' activities might be significantly different. For example, a school might have to wait until summer to implement projects, while a manufacturing facility might wait until production is lower."]

C5 What simple payback period would your business need to achieve in order to undertake an energy efficiency project?

[PROBE: The payback period is the amount of time to recover the cost of the investment.]

C6 Would you like someone from Duke Energy to contact you directly to provide more information or answer any questions you might have about their energy efficiency programs?

We will not share your responses to this survey, only pass along your contact information.

C7 [IF C6=1] To confirm, where is the best number to reach you at?

C8 And who should they get in touch with? [Can you spell your name?]

C9 As part of the study, we may have follow-up questions regarding specific projects implemented at your business and will be conducting onsite visits with a sample of customers. Who should we contact regarding these items?

[RECORD VERBATIM]

C9a And what is their role or position?

C10 Those are all the questions I have. I'd like to thank you for your help with this survey. Do you have any comments you would like to share with Duke Energy?

1 Yes (specify)
2 No

END That completes the survey, thank you very much for your time.

A.1 Non-Participant survey instrument

Duke Energy Non-residential Assessment Program
Non-Participant Customer Survey

Sample Variables

CASEID Unique case identifier

FACILITY_NAM Name of the facility

ACCOUNT_NAM Name of the account

CONTACT NAME Primary customer contact name

YEAR The year the customer contacted Duke Energy about an assessment

ADDRESS The address of the site where the assessment would have occurred

Introduction and Screening

INT01 Hello, my name is [NAME], and I am calling on behalf of Duke Energy. May I speak with [CONTACT NAME]?

1	Yes	
2	Respondent not knowledgeable	[SKIP TO OTHER_R]
3	No	[DISPO CASE OUT]

PREAMBLE I'm calling from Tetra Tech, an independent research firm. We were hired by Duke Energy to talk with some of their customers about their interest in the Non-residential Assessment Program.

Our records indicate that in [YEAR] you discussed with Duke Energy the possibility of participating in the Non-residential Assessment Program but did not complete the assessment. This is a program that performs professional engineering studies in order to recommend energy efficiency projects. Are you able to answer questions about your company's interest in this program?

1	Yes, I'm able to answer	[SKIP TO SCREEN2]
2	Yes, but information isn't quite right	
3	No, I'm not able to answer	[SKIP TO OTHER_R]
4	We have not participated	[SKIP TO OTHER_R]

99	Refusal	[TERMINATE 91]

SCREEN1 What is not correct?

1	Received an assessment but did not install any equipment	[TERMINATE 82]
2	Received an assessment and installed equipment	[TERMINATE 82]
3	Year is off	[SKIP TO SCREEN2]
4	Something else [SPECIFY]	[SKIP TO SCREEN2]

OTHER_R Is it possible that someone else in your organization would be more familiar with the program or the assessment that was considered?

1	Yes	
2	No	[TERMINATE 81]
99	Refused	[TERMINATE 91]

AVAILABLE_R May I please speak with that person?

1	Yes	[SKIP TO INT01]
2	No	[SET UP CALLBACK (When would be a good time to call back?)]
88	Don't know	[TERMINATE 81]
99	Refused	TERMINATE 91]

SCREEN2 Were you involved in the decision whether or not to complete the assessment?

1	Yes	
2	No	[SKIP TO OTHER_R]
99	Refused	[TERMINATE 91]

PREAMBLE2 Great, thank you. I'd like to assure you that I'm not selling anything, I would just like to ask your opinion about this program. Your responses will be kept confidential and your name will not be revealed to anyone. For quality and training purposes, this call will be recorded.

1 Continue

Program Awareness and Marketing (all)

Q1 How did you first hear about Duke Energy's Non-residential Assessment Program? (Select one)

1 Account representative
2 Business Energy Advisor
3 Contractor / Vendor
4 Email from Duke Energy

5 Mail from Duke Energy
6 Colleague/Another business
7 Conference/Trade Show/Expo
8 Duke Energy website
9 Other (specify)
10 Don't know

Assessment Details

Q10 Why did you consider having an assessment done through Duke Energy's Non-residential Assessment Program?

[RECORD VERBATIM]

Q11 Participating in the program involves several steps. Which of the following steps did you complete? [READ LIST, SELECT ALL THAT APPLY]

Q11C01 Did you have an initial call with program staff to discuss the facility characteristics and the focus of the assessment?
Q11C02 Did you complete the online application form?
Q11C03 Did you receive a proposal letter with scope and pricing for the assessment?
Q11C04 Did a program representative come to your facility to do a preliminary walk-through?
Q11C05 Did you have a kickoff call for Duke to collect facility and equipment details?
Q11C06 Did you schedule the onsite assessment?
Q11C07 [DO NOT READ] None selected [SKIP TO Q14]

Q12 On a 0 to 10 scale where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied were you with (each of) the following step(s) in program participation.

For Q12A through Q12F
__ Record satisfaction [0-10]
88 Don't know
99 Refused

Q12A [ASK IF Q11C01=1] The initial call with program staff to discuss the facility characteristics and the focus of the assessment?
Q12B [ASK IF Q11C02=1] Completing the online application form?
Q12C [ASK IF Q11C03=1] The proposal letter with scope and pricing for the assessment?
Q12D [ASK IF Q11C04=1] The program representative coming to your facility to do a preliminary walk-through?
Q12E [ASK IF Q11C05=1] The kickoff call for Duke to collect facility and equipment details?
Q12F [ASK IF Q11C06=1] The scheduling of the onsite assessment?

Q13 [ask for each if Q12 < 3] What could Duke Energy do to improve your satisfaction with [item from Q12]?

For Q13A through Q13F
[RECORD VERBATIM]

Q13A [ASK IF Q12A<3] The initial call with program staff to discuss the facility characteristics and the focus of the assessment?
Q13B [ASK IF Q12B<3] Completing the online application form?
Q13C [ASK IF Q12C<3] The proposal letter with scope and pricing for the assessment?
Q13D [ASK IF Q12D<3] The program representative coming to your facility to do a preliminary walk-through?
Q13E [ASK IF Q12E<3] The kickoff call for Duke to collect facility and equipment details?
Q13F [ASK IF Q12F<3] The scheduling of the onsite assessment?

Q14 Why did you choose not to have an assessment through Duke Energy?

[RECORD VERBATIM]

Q15 What could Duke Energy have done differently so that you would have an assessment completed?

[RECORD VERBATIM]

Q16 Have you made any energy efficiency improvements in the **last** 2 years?

1 Yes [SPECIFY: What improvements have you made?]
2 No
88 Don't know
99 Refused

Q17 Do you have any plans to make energy efficiency improvements in the **next** 2 years?

1 Yes What improvements do you have planned?
2 No
88 Don't know
99 Refused

Q18 [ASK IF Q17=1] Do you plan to participate in a Duke Energy program as part of these energy efficiency improvements?

1 Yes
2 No
88 Don't know
99 Refused

Customer Satisfaction

SAT13 Using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied are you overall with Duke Energy as your service provider?

___ [RECORD RESPONSE]
88 Don't know
99 Refused

SAT14 Why do you say that?

[RECORD VERBATIM]

Customer Characteristics

C1 What is the **main** business activity at [ADDRESS]?

1 Office/Professional
2 Warehouse or distribution center
3 Food sales
4 Food service
5 Retail (other than mall)
6 Mercantile (enclosed or strip malls)
7 Education
8 Religious worship
9 Public assembly
10 Health care
11 Lodging
12 Public order and safety
13 Industrial/manufacturing (DESCRIBE)
14 Agricultural (DESCRIBE)
15 Vacant (majority of floor space is unused)
16 Other (DESCRIBE)
88 Don't know
99 Refused

C2 Are your company's budget decisions made locally, regionally, nationally, worldwide, or something else?

1 Locally
2 Regionally
3 Nationally
4 Worldwide

5 Other (specify)
88 Don't know
99 Refused

C3 When creating budgets and financial plans, how far into the future does your company plan?

0 Less than 1 year
1 One year
2 Two years
3 Three years
4 Four years
5 Five years
6 More than 5 years
7 Other (specify)
88 Don't know
99 Refused

C4 Does your business' production schedule or business cycle affect when you can implement energy efficiency projects?

[PROBE: A business cycle refers to time periods when your business' activities might be significantly different. For example, a school might have to wait until summer to implement projects, while a manufacturing facility might wait until production is lower."]

1 Yes (Please describe that schedule or cycle)
2 No
88 Don't know
99 Refused

C5 What simple payback period would your business need to achieve in order to undertake an energy efficiency project?

[PROBE: The payback period is the amount of time to recover the cost of the investment.]

1 [RECORD VERBATIM]
88 Don't know
99 Refused

C7 Would you like someone from Duke Energy to contact you directly to provide more information or answer any questions you might have about their energy efficiency programs?

We will not share your responses to this survey, only pass along your contact information.

1 Yes
2 No SKIP TO C9

C8_phone [IF C6=1] To confirm, what's the best number to reach you at?

[RECORD PHONE NUMBER]

C8_name And who should they get in touch with? [Can you spell your name?]

[RECORD NAME]

C9 Those are all the questions I have. I'd like to thank you for your help with this survey. Do you have any comments you would like to share with Duke Energy?

1 Yes [SPECIFY]
2 No

INT99 That completes the survey, thank you very much for your time.

A.2 Trade ally interview guide

Duke Energy Carolinas Non-residential Assessment Program
Trade Ally In-depth Interview Guide

This document serves as a guide for interviews with the companies providing assessment services to Duke Energy's Non-residential Assessment Program.

Background for respondent: We are working with Duke Energy to evaluate their Non-residential Assessment Program in the Carolinas. As part of this evaluation, we are speaking with Duke Energy staff, customers, and contractors such as yourself. We will be asking questions about your experience with the program in the past and improvements you would suggest for the future.

I would like to record this call so I can review it later and make sure I capture your responses accurately. Is that OK?

Trade Ally Background

1 What is your role at <company>? What is your role within the Non-Residential Assessment s program?

2 How long has <company> been providing services to the Non-Residential Assessment s program? Have you been involved the whole time?

Program Interaction

3 Who do you interact with at Duke Energy in connection with the Non-Residential Assessment s program? Can you describe your interaction with them? (e.g., method and frequency of communication) Do you have any suggestions for improving

communication?

4 What information or training did/does Duke provide as part of the Non-Residential Assessment s program? Is the information or training sufficient? Is there anything additional Duke could provide (either technical or regarding program operation)?

Customer Interaction

5 How do you initiate interaction with a customer? What are the steps that your company completes with the customer? (e.g., How involved are you in the application process?) Do you feel that this process works well, or are there areas that could be streamlined?

6 What types of materials or information do you provide to customers during different phases of a project? (start-up and planning, execution, wrap-up) Have you received any feedback, positive or negative, on any of these materials or information?

7 What challenges do you face when planning an assessment? Conducting an assessment (types of equipment, types of buildings)? Reporting?

8 How do you present the assessment results to the customer? Do customers tend to anticipate what is coming? How often do customers already know about issues that are confirmed by the assessment?

9 Do you think there are certain types of recommendations that customers are more likely to follow through? Are there recommendations where customers don't seem to follow through? (What are they?)

10 Why do customers *not* follow through with recommendations? (if money/budget, what other reasons?) What could the program do to address this? Are these issues that could be anticipated before the assessment?

11 Do customers respond well to the incentive estimates? Are there recommendations where incentives are not sufficient?

12 What do you do to connect customers with contractors who can complete the work? Have you encountered any issues with that hand-off?

Wrap-up

13 What challenges does your company face in supporting Duke's Non-residential Assessment Program? What could be done to address these challenges?

14 What do you think are the strengths of the Non-residential Assessment Program? What aspects of the program work well for your company? For customers?

15 Is there anything Duke Energy could do better to support your participation in the Non-residential Assessment Program?

16 Do you have anything else to add that we haven't already discussed?

Those are all the questions I have today. Thank you for your time.

Nexant, Inc.

1255 Crescent Green, Suite 460

Cary, NC 27518-8123

Tel: (919) 334-7650

www.nexant.com